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# THE WILSON BULLETIN

A QUARTERLY MAGAZINE OF ORNITHOLOGY
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Vol. XLVII JUNE, 1935 No. 2

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## A STUDY OF THE NESTING AND FAMILY LIFE OF THE RED-THROATED LOON

BY R. A. JOHNSON AND HAZEL S. JOHNSON

The following notes on the Red-throated Loon are taken from our study of the birds of the North Shore of the Gulf of St. Lawrence during two summers spent in the vicinity of Cape Whittle in Saguenay County, Quebec. In 1931 we were at Wolf Bay, some nine miles west of the Cape for nine weeks, and for ten days on the St. Mary Islands which are located approximately twelve miles east of Cape Whittle. For a six week period in 1934 we made the St. Mary Islands our headquarters while working there and on the Boat Islands near by.

Eleven nesting pairs of birds were studied: one on the mainland in 1931 and ten pairs during 1934, six of which were within the St. Mary Island Sanctuary and four outside its protection on the Boat Islands. Observations were made from a blind, of incubating birds at the Wolf Bay nest in 1931, and at one nest in the sanctuary in 1934.

The Wolf Bay nest was typically located on the bank of a fresh water lake a few yards long and half as wide. While this lake was on the mainland all other nesting lakes observed in 1934 were insular. On one island two occupied lakes were not more than fifty yards apart. All nests were placed so near the brink of their lakes that the loon could slide into and under the water with one "push off". The laying date for one early nest in the sanctuary was May 25, and for another on the Boat Islands was June 29. This latter one was a second nesting attempt for the season, as the one at Wolf Bay on June 28, 1931, may also have been.

While the two drab colored eggs were laid in a slight hollow of a nest which had only enough depression to keep them from rolling into the water, there was, in every case, collected nesting material—usually sphagnum moss, crowberry vine, and reindeer moss.

Three pairs of the birds observed in 1934 attempted to re-nest after losing their eggs during the early incubation period. In each case a second nest was made a few feet from the location of the old

one. In other cases the birds which lost their eggs remained in possession of the lake but did not, apparently, try to re-nest.

An adequate description of the size and color of the eggs has been given by Bent[1]. In every instance known to us two eggs were laid in each nest. From the Wolf Bay nest one egg was lost in some unknown way, but the remaining egg was cared for and hatched.

Incubation begins when the first egg is laid, so that the chicks hatch from twenty-four to thirty-six hours apart. Both sexes share in the duties of incubation and it may be said that they are quite devoted to the nest. Unless disturbed one or the other of the pair will be found on the nest throughout the day and night. When one egg is lost the

FIG. 9. Left, sea-shell found in Red-throated Loon's nest with egg. Right, young loon about three weeks old.

birds continue incubation as shown in two cases observed. But the most remarkable instance of their devotion to the nest was shown by an incident observed in August, 1934. A pair of birds incubating on the second nest site had lost their eggs or had had none—no eggs were seen—and they were faithfully sitting on a spiral shaped sea shell of about the same size as a loon's egg. (See figure 9). We cannot explain how the shell got into the nest and was adopted. It may have been dropped near the nest site by a gull, but this seems unlikely since the shell was not fresh but very old and worn. Apparently the pair of birds had been sitting on the shell for several days as it was polished quite smooth. To make certain of this record, the nest was visited five times in three days, twice before dawn. In all cases an

[1]Life Histories of North American Diving Birds, by Arthur Cleveland Bent, United States National Museum Bulletin 107, 1919.

incubating bird was at the nest. Three times it was seen hovering the shell. Finally on August 2 the shell was collected to encourage the faithful pair in a more profitable occupation.

The incubation period of the Red-throated Loon is thirty-eight to forty days. This was determined in the summer of 1934 in the following manner. On June 30 a nest containing one fresh egg was found on the Boat Islands. By August 2 this nest had not hatched so the two eggs were taken and placed under a broody chicken hen which had been brought from the States for that purpose. One of these two loon eggs hatched under the chicken on August 7, thirty-nine days after the first egg was laid.

The incubating bird always faced the water. As it sat on the nest it was often seen to pull twigs of crowberry, labrador tea, and moss about its breast or to rearrange them to better advantage. When returning to the nest lake the bird did not always go onto the nest at once. Although no sound was made in the blind the loon might suddenly fly from the water and its wail could be heard as it circled about the nest lake. This action might be repeated two or three times before the bird attempted to climb the bank from the water to its nest. Failing to gain the brink the first time, the bird would swim along the shore several feet, trying at several places until it gained a foothold. Coming to the nest from the back or side the bird turned in such a manner as to face the lake, lowered its breast onto the front rim of the nest and, with its feet, attempted to adjust the position of the eggs to the incubation spot which is far back on the long body. If this position failed to satisfy, the bird would raise up and with the mandibles slightly parted, push the eggs into the desired position. Again lowering itself onto the eggs, it settled with the usual rolling motion of an incubating bird. One settled to its liking, the bird sat quietly, even dozing now and then; caught a passing fly in its bill or picked at its wings and back. At the least note of warning from a passing gull the loon would stretch its neck upward turning the head from side to side. At such times a slight expansion of the throat muscles could be seen, and if the alarm continued the bird would stretch head and neck flat along the ground, to escape detection, apparently. Slight notice was taken of a visiting Eider Duck on the nest lake.

The young of the Red-throated Loon is black over the upper portions of the body and smoky black beneath with a mergence of both shades about the neck and over the head. After three weeks it appears lighter and more blue-black in color.

The chick seems to have but one call which is a low, rasping, drawn out "*cru-ee-ep*", that can be heard from only a short distance. This cry is heard when the bird is chilled and wants to be hovered or when it is hungry.

The chicks were never carried on the parent's back, although one young bird was occasionally seen attempting to climb onto the back of a parent while in the water. Hovering always took place on the bank of the nest lake. So far as protection is concerned the young are dependent upon their color which makes them nearly undiscernible along the lake shore, and upon their ability to dive, an accomplishment at which they are most adept.

When young the chicks need hovering more often than in later life. The parent bird left the water many times a day, climbing onto the bank at the nest site or that of an old nest and settling itself comfortably facing the water. The chicks followed but were never seen to climb onto the bank unless preceded by the adult although they frequently went back to the water alone. A quotation from our notes, taken from the blind in 1934 while observing a four-day-old chick, is of interest in describing the life of the young loon. "6:50 P. M., July 6, one parent and one chick are swimming about in the center of this small nest lake keeping close together. Once the parent dived, so did the chick, and they swam together again; 7:00 o'clock, chick began to whimper. Temperature is 52° F. Soon the parent bird swam to an old nest site on the opposite shore of the lake, climbed out and settled itself. The chick immediately followed, went to back of parent, crawled forward and up under the wing which was held out for it. The chick then hovered as observed before, up on the crural feather tract under the tips of the secondaries from where its head sometimes protruded above the back feathers of the adult. After ten minutes of hovering the second adult alighted on the lake with a fish approximately five inches long, swam near to the hovering bird and gave a low throaty '*car-ow-ow-w*'. Meanwhile it kept dipping the fish below the surface of the water. Soon the chick came to the edge of the water but turned back and was hovered again as before. The adult with food continued to call. In three minutes the young one swam out some three feet, took the fish and struggled with it for a minute; then started to shore, dropped the fish, and went back to be hovered, this time under the other wing of the old bird. The adult which brought the fish, recovered and ate it, then remained on the lake for ten minutes. During this time both old birds exchanged cooing notes sounding similar to the courting calls of the male Eider Duck, except

FIG. 10. Left, nest of Red-throated Loon. Right, young loon, about four weeks old, swimming alone in lake.

FIG. 11. Nest of Red-throated Loon, with newly hatched young and egg.

that they were pitched much lower. The hovering bird then slid into the water, gave two '*car-ow-ow-w*'s and both adults flew from the lake. In three minutes one adult returned and hovered the chick."

Numerous observations were made from the blind on the food and feeding of the young at different stages of growth. So far as we could determine whole fish were fed from the beginning. These were unbelievably large for the size of the young bird. On two occasions a bird three weeks old seemed to be taking Caddis Fly larvae from the lake. This note, however, could not be verified. Among the fish fed the Sand Lance (*Ammodytes americanus*), Gunnel (*Pholis gunnellus*), and Capelin (*Mallotus villosus*) were identified. One adult loon was observed on several different days fishing in a sandy harbor where Lance were numerous and carrying her catch to an island about two miles away.

The growth of the young of the Red-throated Loon is comparatively slow. One chick was observed periodically from the day it hatched until it was five weeks old. At this time it was about two-thirds grown but had only begun to show feathers about the shoulders. The flight plumage appeared to be pins about one inch long. Mr. Fred Osborne, the Sanctuary keeper at St. Mary Islands, believes that these young do not fly before they are two months old. Our studies indicate that his estimate is fairly accurate. When we left the Sanctuary on August 7 no young birds had as yet flown from the nest lake. The oldest one at that time was approximately seven weeks old.

One young loon three weeks old weighed 152 grams and showed primary pins one quarter of an inch long. No other feathers were showing in this bird. On another lake a young bird of about three weeks of age weighed 185 grams. The tarsus measured $1\frac{9}{16}$ inches, the wing spread nine inches. The eye was chocolate brown color with a black pupil.

Like most other forms of bird life the Red-throated Loon has many natural enemies. But in this study only two could be seen to play a very important rôle. These were the Great Black-backed Gull and man. The gull is a notorious egg eater and will usually take the loon's eggs if they are found unprotected. The fact that they are so nearly the color of the ground is of course some protection. Young loons are undoubtedly taken by gulls. On one occasion we visited a lake where a three weeks old bird was swimming about, apparently normal. After the bird had dived three or four times it could not get under the water again until it had rested for a few moments. This bird was lost that day probably to a gull. It may be that this loon

had been weakened from some other cause and should not be charged entirely against the gulls. On another lake two birds not more than three weeks old were lost, presumably to gulls. There were no other predators on the island. Two nests of eggs were known to have been taken by gulls and others were thought to have gone the same way.

Man is also a notorious egger but, in case of the loon, his damage is, for the most part, unwittingly committed as an ally of the gull. When the loon is frightened at the approach of man, it will, as a rule, leave the nest, often staying away for some time. As soon as man leaves the island the gulls settle down to the business of securing any available food. If the loon has not returned to its nest the eggs may be taken. The Great Black-backed Gull seems to be a very intelligent bird. We have seen individuals which appeared to learn to give a false alarm as a means of getting a chance at the eggs of nesting birds of other species which have come to depend upon the gull to announce an approaching enemy.

With the incubation of this loon known, and the length of time spent on the nest lake approximately determined, it is safe to assume that the late hatched birds from second nests which do not fly until about October 1, have but a poor chance to survive. The one such nest in 1931 was hatched August 6 and one in 1934 on August 7.

The ten pairs of birds observed in 1934 made thirteen nests. One late nest was collected. An egg in one nest was left addled. Presumably two other eggs should have hatched, since their mates did. Twelve eggs were lost before incubation was completed. Three young loons were raised, each from a different nest. The four young that were lost went at the following ages: one at one day of age, three at approximately three weeks, although no two went at the same time. Thus the twelve nests produced three birds this year. We believe that this is far below the normal production and that the severe damage done by gulls must be considered in light of the fact that the natural food (fish) for gulls was so scarce that at least seventy-five per cent of their young starved to death.

Any attempt to evaluate the nesting success of a species should consider the effect of the study as a factor. Accordingly, of the total damage done by gulls, two nests of eggs and one young bird were lost when the old loons were away from the nests due to our activities or those of other people on the island. Perhaps this loss should be charged to the study. Certainly we were the indirect cause of the loss although some of it might have occurred in any case.

Oneonta, N. Y.

# THE CONSTANCY OF CATBIRDS TO MATES AND TO TERRITORY

BY GEOFFREY GILL

At Huntington, Long Island, New York, during the last three years, the writer has been interested in the study of Catbirds (*Dumetella carolinensis*) in relation to territory. Many resident nesting Catbirds have been banded with colored bands and it is possible to ascertain the constancy of pairing and to territory during a single season and following seasons.

Of twelve nests studied during the past three seasons in which all parent birds were banded, in four cases, both parents wore colored bands and in the remaining eight cases at least one of the parents were so marked.

In the *Bulletin of the Northeastern Bird-banding Association* (Vol. I, pp. 48-49) Mrs. H. G. Whittle records a case of a pair of Catbirds which were constant throughout a season, successfully rearing two broods. In the twelve cases recorded here there is no similar case, because not a pair in my records were successful in raising two broods in a single season, but cases of constancy do exist.

The most interesting records are of a pair of this species which, for convenience, are named "6M32", being the male on territory 6 in 1932, and "6F32", his mate. These two birds were banded in mid-June, 1932, and it is thought that due to the lateness of the date of the nest building, some ten feet east of the banding station, that this was a second nesting. Their brood of two left the nest on July 18. While the female or the young were never seen or taken in the traps again that season, the male repeated on August 20.

In 1933, 6M32 returned on May 13 and was observed singing on territory 1 the next day. This territory proved to be his home for 1933, located some 250 feet southeast of his 1932 residence. This territory was occupied during the previous year by another pair so was decidedly not a part of his original territory. 6M32 won a new mate and built a nest a foot from the nest-site of the 1932 occupants of this thicket. During incubation, on June 8, the four eggs and the female disappeared. 6M32 was very silent for two weeks but was seen frequently on the same territory. Another mate, an unbanded bird, appeared on June 23 and it is believed that a second nest was built some seventy feet south of the first attempt, however the nest was never found. The male repeated in our traps on August 6.

6M32 appeared again in our traps on May 17, 1934, and he was seen singing three days earlier on territory 1, being constant to terri-

tory for the second season and third nesting. His mate for the first nest was a bird banded on the left leg. Again the nest was built in almost the same spot as in previous years and again the eggs were stolen.

The second nest, with a new mate, banded by us on June 16 and wearing colored bands, was built to the southward a short distance but was too well hidden for discovery. The male repeated in our traps again on August 17*, obviously molting.

The above male changes mates apparently with each nesting but was fairly constant to territory.

6F32, the mate of the above male in 1932 was not retaken in our traps until July 1, 1933, but she was found on May 21, 1933, mated with a bird banded on the right leg on territory 7, 310 feet east of her former territory and the closest Catbird neighbor to her mate of the former year. During incubation the four eggs disappeared, but both birds stayed on the same territory. A new nest was started shortly afterwards some sixty feet farther east and the three young left this nest on July 30. One of these young repeated in our traps on August 19, but all others of the family were never seen or trapped again. In this case the female changed territories and mates from one season to the next but she was constant to her mate and to her territory during a single season.

In the case of 2F33, on territory 2, 300 feet northeast of the banding station, she mated with a bird banded on the right leg throughout her two known nestings in 1933 and the first nesting of 1934. The second nesting for 1934, if it existed was not recorded. These two birds changed territory with each nesting in 1933, being first on territory 2 and then building a second nest, after the first was broken up, on territory 8, some 200 feet north of the first nest-site. Their first nest in 1934 was again on territory 8. This pair shows the greatest constancy of mating, if not to territory, if the male was always the same bird banded on the right leg. This fact is doubtful as I have banded 494 of these birds and many of this species are banded on the right leg. Only ninety individuals wear colored bands.

In the case of 9M33 and 9F33, it is interesting to note that this male, banded August 11, 1932, is one of the few immature birds which I have recorded to return. He was found on May 20, 1933, with his mate, nesting on territory 9, 250 feet west of the banding station. The four young left the nest on June 16. The female repeated in our traps

*It should be noted that with the exception of the first year, this bird only appeared in our traps as stated, although residing less than 300 feet away from the trapping station.

on June 18, and again on July 11 and 29. On July 15 the male, without a tail and obviously molting was taken in our traps for the first time that season. If a second nest existed it was never found. On May 12, 1934, 9M33 returned and with a new mate nested again on his 1933 territory, building a nest thirty feet south of the former site. During incubation the nest was destroyed, probably by a cat. The birds were not found again until the male repeated in our traps on August 10. This bird was not constant to his mate but was constant to territory.

In the nine nestings mentioned above constancy is shown by Catbirds in varying degrees to mates and to territories. Of the three remaining nests in which birds were recognizable by colored bands none of them returned or during a single season showed any constancy.

Huntington, L. I., N. Y.

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## FOREST EDGE BIRDS AND EXPOSURES OF THEIR HABITATS

BY J. RICHARD CARPENTER

In studying the bird population of forest edge communities of University and Brownfield woods near Urbana, Champaign County, Illinois, during the winter and spring of 1932-33 it was found that there was a marked selection by the majority of birds in regard to the exposure-direction of the habitat selected. The prevailing winds of the region during that period of the year are from the west and southwest and it was apparent that the birds selected exposures on the "lee" sides of the woods in both of the tracts studied.

The dominant vegetation of the thickets of the forest edges studied was redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), young elms (*Ulmus americana*), spicebush (*Benzoin aestivale*), button bush (*Cephalanthus occidentalis*), several species of ash (*Fraxinus* spp.), and haw (*Crataegus* spp.). For a further description of the tracts of woodland studied see McDougall '22, Smith '28, and Blake '31.

Data regarding the bird population were obtained by cruising through the forest edge, recording all of the birds in a strip approximately twenty feet wide, which included the major portion of the thicket at the edges of the woods. In both cases the route of observations was about one mile long and since in both cases also the woods were slightly longer than broad, the north and south exposure observations are over a slightly smaller area than are the east and west observations.

The accompanying table lists the birds observed, with notations following the individual figures as to where the majority of that given

| | N.12b | N.20b | D.10b | J.8b | J.21b | F.25b | F.26u | M.4b | M.5b | M.19u | M.27b | M.27u | A.2u | A.9u | A.23u | A.30u |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Flicker | 1e | | | | | 1e | | | | 1s | | | | 2s | 8 | |
| Yellow-bellied Sapsucker | 1e | | | | | | | | | | | | | | | |
| Red-bellied Woodpecker | 1n | | 2e | | 2 | | | | | 1w | 2n | | | 1n | | |
| Downy Woodpecker | 3n | 1n | 5 | 1e | 9c | 2 | 2 | 13*e* | 1w | 2 | 4c | 1e | 6*n* | 2e | 5*e* | |
| Tufted Titmouse | 5e | 12c | 4 | 7 | 11 | 2e | | 28*e* | 1s | | 3 | 4e | 4n | 7e | 1w | 3 |
| Hairy Woodpecker | | 1n | | | | | | 1e | | | | | | 1e | | |
| Cardinal | | 8c | 1s | 1s | 3e | 3c | 3 | 9*e* | 1e | | 2e | | 1e | 2e | 6c | 3e |
| Chickadee | | 1e | 5e | | 5e | | | | | | 1n | | | | | |
| Junco | | 4e | | 4s | 2 | 15c | 5 | 5e | 25e | 60s | 1s | 85*n* | 17*n* | | 4n | 2n |
| Brown Creeper | | 1n | 2e | | 4*e* | | | 3*w* | 1w | | | | 1n | 1w | | |
| Ruby-crowned Kinglet | | 2n | | | 2c | | | | | | | | 2n | | 1w | |
| Blue Jay | | | 2e | | 2e | | | | | | | | | | | |
| Red-breasted Nuthatch | | | 1w | | 4n | | 1e | | | | | | | | | |
| Bluebird | | | | | | 2e | | | | | | | | | | |
| Robin | | | | | | 7c | 9*e* | 80*n* | 1s | 7s | 5*n* | | | 1e | 4c | |
| Miscellaneous Sparrows | | | | | | | 28c | | | 3n | | | | 1w | 4c | |
| Field Sparrow | | | | | | | | 127e | 1e | | | | 1n | | 1w | |
| Towhee | | | | | | | | | | 1s | 2e | | 1e | 1e | 1s | |
| Bronzed Grackle | | | | | | | | | | 5s | 21*n* | 4s | | 4s | | 3 |
| Wood Thrushes | | | | | | | | | | | | | 2 | 2 | 3 | 9*e* |
| Tree Sparrow | | | | | | | | | | | | | 3 | | 5*s* | 3s |
| Brown Thrasher | | | | | | | | | | | | | | 1e | 2w | 2 |
| Miscellaneous Warblers | | | | | | | | | | | | | | | 1w | 8c |
| White-eyed Vireo | | | | | | | | | | | | | | | 4w | 1e |
| White-throated Sparrow | | | | | | | | | | | | | | | | 60e |
| Catbird | | | | | | | | | | | | | | | | 3e |
| Miscellaneous and Indet. | | | | | | 12n | | | | 4w | 9 | 7s | | 10n | | 3e |
| Total Individuals | 11 | 30 | 22 | 13 | 44 | 44 | 51 | 266 | 30 | 84 | 50 | 97 | 39 | 36 | 49 | 104 |
| Number Species | 5 | 8 | 8 | 4 | 10 | 8 | 7 | 8 | 6 | 9 | 10 | 4 | 11 | 14 | 15 | 16 |
| North Exposure | 4 | 17 | | 4 | 9 | 23 | 1 | 50 | | 5 | 30 | 84 | 28 | 11 | 6 | 11 |
| East Exposure | 7 | 7 | 15 | 1 | 25 | 6 | 11 | 197 | 26 | | 7 | 1 | 9 | 17 | 13 | 80 |
| West Exposure | | | 6 | | 10 | | 21 | 19 | 2 | 6 | | | 1 | 2 | 19 | 8 |
| South Exposure | | 6 | 1 | 8 | | 15 | 18 | | 2 | 73 | 13 | 12 | 1 | 6 | 8 | 4 |

species for that date occurred. The statistical summary at the conclusion of the table gives the total number of birds in each exposure for that woods that day.

In the winter and early spring a great number of birds occupy one preferred exposure to the marked exclusion of those habitats which are more rigorous; the Brown Creeper, Titmouse, Chickadee, and Bluejay were most noticeable among these. In the late spring the total population is spread over more exposures with much less noticeable selection; these birds, save the Junco, were apparently consistent in their lack of discrimination of habitat. The Junco individuals which spend the late spring and summer months in the region showed a marked selection for the northern exposures; this was not evident for the winter residents of the species. The east exposure (the "lee" side with reference to the prevailing winds) had by far the greatest bird population in all seasons observed. Insect population studies conducted during the same period gave no similar habitat selection with respect to exposure.

It is interesting to note that while the average number of species observed was eight during the winter and early spring (the hiemal and prevernal periods), the late spring (vernal) practically doubled the number of species observed each day. Seasonal progression and the arrival of species is also evident.

### Literature Cited

Blake, Irving H. 1931. Further studies on deciduous forest animal communities. Ecology, 12:508-527.

McDougall, W. B. 1922. Symbiosis in a deciduous forest, I. Bot. Gaz., 73: 200-212.

Smith, Vera G. 1928. Animal communities of the deciduous forest succession. Ecology, 9:479-500.

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## Table I

(See preceding page)

### Selection of Habitats and Exposures by Forest Edge Birds
November 12, 1932-April 30, 1933

Explanation of Symbols Used in Table

| | |
|---|---|
| b | Observation made at the Brownfield woods. |
| u | Observation made at the University woods. |
| n | Individuals found exclusively in northern exposures. |
| e, w, s | Individuals exclusive to respective exposure: east, west, or south. |
| *n* | Most of the individuals in north exposures, but not exclusively so. |
| *e*, *w*, *s* | As in *n* for the respective exposures. |
| c | Cosmopolitan: individuals occurring in three or more exposures. |
| | No initial: in two habitats, more or less evenly distributed and showing no apparent selection. |

# NOTES ON NESTLING ROBINS

BY W. J. HAMILTON, JR.

The following notes were made at Ithaca, New York, over a four-year period (1930-1933). Data were secured on four sets of Robin nestlings; the nests being located in exceptionally favorable situations which made observation easy. As little has been recorded on the change in weight, both gains and losses of altricial birds, the records tabulated may prove useful to some bird students.

Plumb (1884)* made thirteen weighings of two nestling Robins from July 28 to August 9. The average weight at one day was 5.9 grams, and on the thirteenth day they averaged 55 grams. One bird showed a loss during the last two days in the nest; the other showed no loss but did not increase in weight during the same period. Plumb attributed the loss in weight to a severe infestation of lice.

In securing data on weights, the young birds were removed from the nest immediately upon hatching and weighed before they were first fed. It is possible two of the six birds weighed at hatching had been fed, but I am not certain on this score. Thereafter, the young were weighed at the same hour (7 A. M.) daily, until they had left the nest.

The average weight of twelve freshly laid Robins' eggs was 6.58 grams. Due to the evaporation of gases from the egg during incubation, a perceptible loss was noted after ten days of incubation. The small number of eggs weighed does not give indicative figures regarding the correct percentage of this loss. The weighings do suggest a loss of more than twenty-five per cent of the original weight.

Newly hatched Robins average 6.6 grams. At fourteen days, when leaving the nest, they weigh 56 grams. This is an increase amounting to more than eight times the original weight.

| Age in days | No. weighed | Average weight of one (grams) | Gain or loss in weight | Daily per cent gain or loss in weight |
|---|---|---|---|---|
| At hatching | 6 | 6.6 | ..... | ..... |
| 1 | 10 | 8.9 | +2.3 | +35 |
| 2 | 10 | 14.3 | +5.4 | +60 |
| 3 | 10 | 21.3 | +7 | +49 |
| 4 | 10 | 26.6 | +5.3 | +25 |
| 5 | 10 | 32.2 | +5.6 | +21.5 |
| 6 | 10 | 40.1 | +7.9 | +24.5 |
| 7 | 10 | 47 | +6.9 | +14.4 |
| 8 | 10 | 52 | +5 | +14.7 |
| 9 | 10 | 55.2 | +3.2 | + 6.1 |
| 10 | 10 | 54.9 | — .3 | — .54 |
| 11 | 10 | 56.3 | +1.4 | + 2.55 |
| 12 | 10 | 54.8 | —1.5 | — 2.66 |
| 13 | 10 | 55.7 | + .9 | + 1.64 |
| 14 | 6 | 56 | + .3 | + .54 |

*Plumb, Charles. 1884. Increase in Growth of Young Robins. Science 4 (82), p. 159. Aug. 29.

The loss in weight on the 10th and 12th day is difficult to account for. The birds were in good health, not unduly disturbed, and free from all external parasites, while the remiges and rectrices were well erupted.

The nests under observation were favorably placed, being on window ledges, cornices of porches, and other low situations. Two that were placed on windows made it possible for the observer to take notes ten inches from the nest without being seen.

The food during late May and early June consisted principally of cutworms. From the earliest period these larvae form a prominent share of the menu. From two to six, depending on the size, are brought to the nest at one time. Usually two large cutworms represented an average meal throughout the day. By closely observing several pairs of Robins throughout the nesting season, it was possible to estimate the daily number of visits these birds paid to the nest. An average of ten visits per hour, from 5 A. M. to 7 P. M. accounts for 140 daily trips made by the old birds. Being extremely conservative, we might reckon a hundred trips daily to be a fair average throughout the fourteen days that four sets of nestlings spent in the nest. This would entail 1400 trips by the parents in feeding the young.

In order to determine the quantity of food eaten by the young birds, the freshly fed cutworm, adult insects, worms, etc., were occasionally removed from the young with blunt forceps, immediately upon being fed by the parent birds, and immediately weighed. This procedure was inaugurated while the birds were but a day or two old, and continued on alternate days until the young left the nest. By this method it was estimated the birds brought to the young approximately two grams of food at each visit, or a daily feeding of 200 grams of animal matter to the nestlings, be they three, four, or five.

The estimate is high for the early days in the nest and low for the days immediately preceding the time of leaving the nest. It is thought to be fairly accurate and, at least, gives some clue to the amount of food eaten. Robins feed their young, apparently regardless if there be three or five, approximately 3.2 pounds of food during the two weeks while in the nest. The observations were made several weeks before cherries ripened and, because of this, the food consisted almost entirely of animal matter.

Birds take the most available food, providing it is acceptable to them. During an entire day in early June a pair of Robins brought

to their young numbers of the large cranefly (*Tipula trivittata*), which were everywhere common. The mating insects were easily caught, and frequently a bird would approach the nest with two, or even three, pairs of these mated flies.

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## THE DUCK SITUATION IN THE PRINCE ALBERT DISTRICT, CENTRAL SASKATCHEWAN

BY O. C. FURNISS

There has been a great deal of controversy lately over the decrease in the numbers of ducks; so much so, that the writer decided to make a fairly detailed survey of a particularly favorable area in an attempt to draw conclusions as to the existing conditions in that area.

This report is based on a survey of ninety-nine potholes and sloughs on sixteen quarter-sections about five miles south of the city of Prince Albert.

The Prince Albert district is on the dividing line between the typical Canadian and Transition life zones. It is in the heart of the pothole country and as a breeding ground for ducks is looked upon as excellent. The area worked consisted of a creek, which backs up in the spring to keep the water level of some of the sloughs fairly constant throughout the summer, wooded areas with aspens as the main tree, field crops such as wheat, oats, and barley; and hay meadows. The surface of the land is rolling which accounts for the large number of sloughs and potholes.

It was necessary to work quickly in order that the water levels of all the area worked would be in the same ratio with one another, to avoid counting one brood more than once, and also to have the "cover" of one slough to compare with that of another. The work was started late in July in order that the water levels and food might be more readily discernible.

The potholes and sloughs examined varied in size from one-half acre to twelve acres, the average being 2.6 acres. The areas taken were those of the open water. Every pothole in the list has open water throughout the summer.

The Graph 1 (Fig. 12) shows the number and size of the bodies of water examined.

DATA FOR GRAPH 1

| No. | Smallest | Largest | Average |
|---|---|---|---|
| 99 | ½ acre | 12 acres | 2.6 acres |

Many of the potholes contained fresh water, particularly those that were fed by the overflow from the creek in the spring. There was no evidence of excessive alkalinity in any of the water in the whole area.

In listing the surrounding "cover" about the sloughs and potholes only the main characteristic plants are mentioned. The provision for suitable nesting sites was the basis for the terms "good", "poor", and "fair".

Those classed as "good" had a good stand of Scirpus or Typha in the water and a secondary ring around the land edge of Panicularia grandis, Scolochloa festucacea, or various species of Cyperaceae such as Scirpus americanus or some of the Carex group. The inner ring being considered suitable for the diving ducks and the outer satisfactory for the surface feeding. Those classed as "fair" had either one of these rings but not both; and those classed as "poor" had neither of these rings or only traces.

CLASSIFICATION ACCORDING TO COVER

| No. | Good | | Fair | | Poor | |
|---|---|---|---|---|---|---|
| | No. | Per cent | No. | Per cent | No. | Per cent |
| 99 | 62 | 62.62 | 16 | 16.16 | 21 | 21.21 |

The main plants found to form the cover around these sloughs and potholes were: Scirpus validus, Scirpus americanus, various Carex, Panicularia grandis, Scolochloa festucacea, and other grasses. In one or two cases odd patches of Phragmites phragmites were noted. No attempt was made to estimate the particular percentage of any one plant with any other plant around a particular body of water. Instances of traces of other plants than those mentioned were discarded; only the characteristic plants were considered.

The grazing of livestock around the edge of some sloughs seriously affected the outer growth and destroyed the nesting sites for surface ducks. However, most of the potholes and sloughs in this area have a growth of aspens and willows around them, very often to within thirty or forty yards of the water, thus alleviating conditions to a certain extent. Mallards in particular frequently nest in willow growth around small potholes.

Most of the bodies of water classed as "fair" had the outer land edge of cover destroyed by stock.

The following table gives the number of bodies of water containing specific cover plants abundant enough to form a characteristic part of the cover around them.

| Specific plant abundant enough to form one of the characteristic covers | No. of sloughs in which it was abundant | Percentage of sloughs in which it was abundant |
|---|---|---|
| Typha latifolia | 62 | 62.62 |
| Scirpus validus | 52 | 52.52 |
| Scirpus americanus | 32 | 32.32 |
| Panicularia grandis | 41 | 41.41 |
| Hordeum jubatum | 2 | 2.02 |
| Scolochloa festucacea | 35 | 35.35 |
| Carex ssp. | Various species were very common | |

Food plants were noted as being common. As with the "cover" plants, no attempt was made towards a detailed list at any slough; those mentioned were the more readily apparent and in most cases seemed abundant.

| Sloughs with ample food | | Sloughs with food noted as scarce | |
|---|---|---|---|
| No. | Per cent | No. | Per cent |
| 87 | 87.87 | 12 | 12.12 |

The following table gives the number of bodies of water containing specific food plants abundant enough to form a characteristic part of the food in them.

| Specific plant abundant enough to form one of the characteristic foods | No. of sloughs in which it was abundant | Percentage of sloughs in which it was abundant |
|---|---|---|
| Potamogeton ssp. pectinatus perfoliatus | 61 | 61.61 |
| Cyperaceae S. americanus S. validus Carex ssp. | 56 | 56.56 |
| Scolochloa festucacea | 35 | 35.35 |
| Ranunculus aquatilis | 7 | 7.07 |
| Lemna minor | 5 | 5.05 |
| Naias flexilis | 5 | 5.05 |

Other foods present but not in abundance:

Ruppia maritima.
Sagittaria latifolia.
Polygonum amphibium.
Eleocharus palustris.

In twelve of the deeper sloughs no food was readily apparent, this may have been because the food was beneath the surface and not so readily discernible.

Many of the bodies of water containing an abundance of food did not shelter a single brood. The following table is based on the eighty-seven sloughs and potholes that did contain ample food which was readily apparent.

| Food and Duck Broods | | Food and No Duck Broods | |
|---|---|---|---|
| No. | Per cent | No. | Per cent |
| 40 | 45.96 | 47 | 54.04 |

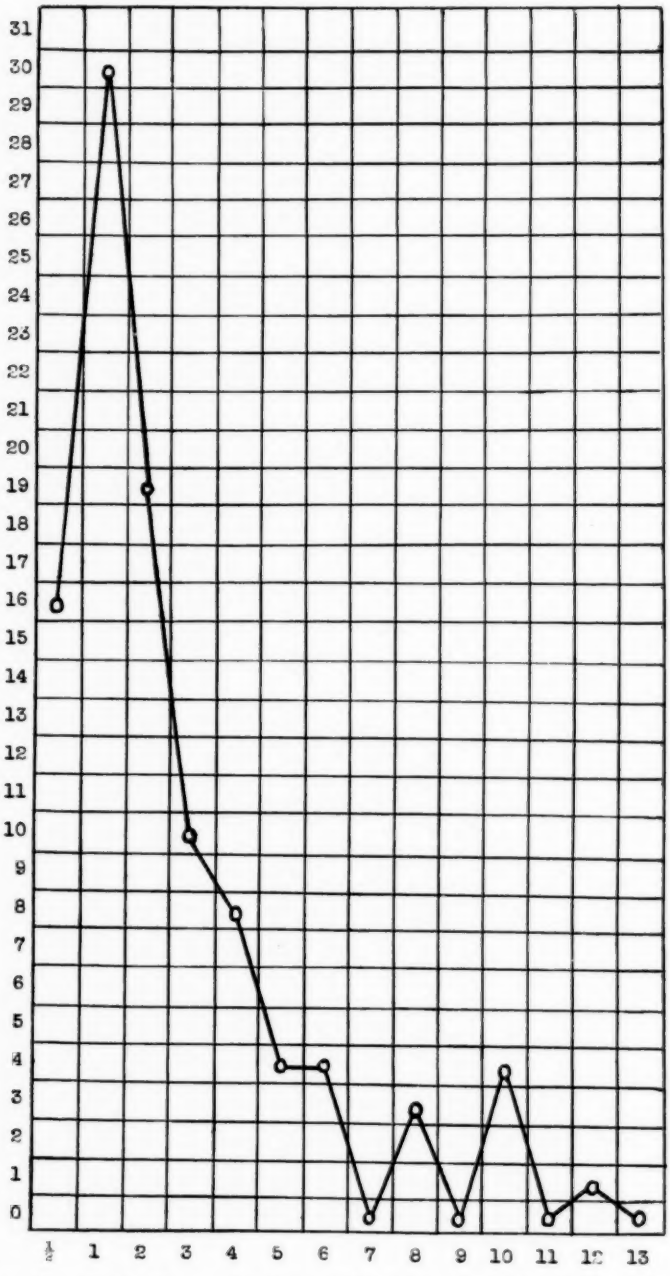


FIG. 12. Graph No. 1, showing number and size of the bodies of water examined. Vertical scale indicates number of sloughs; the horizontal scale, the size in acres.

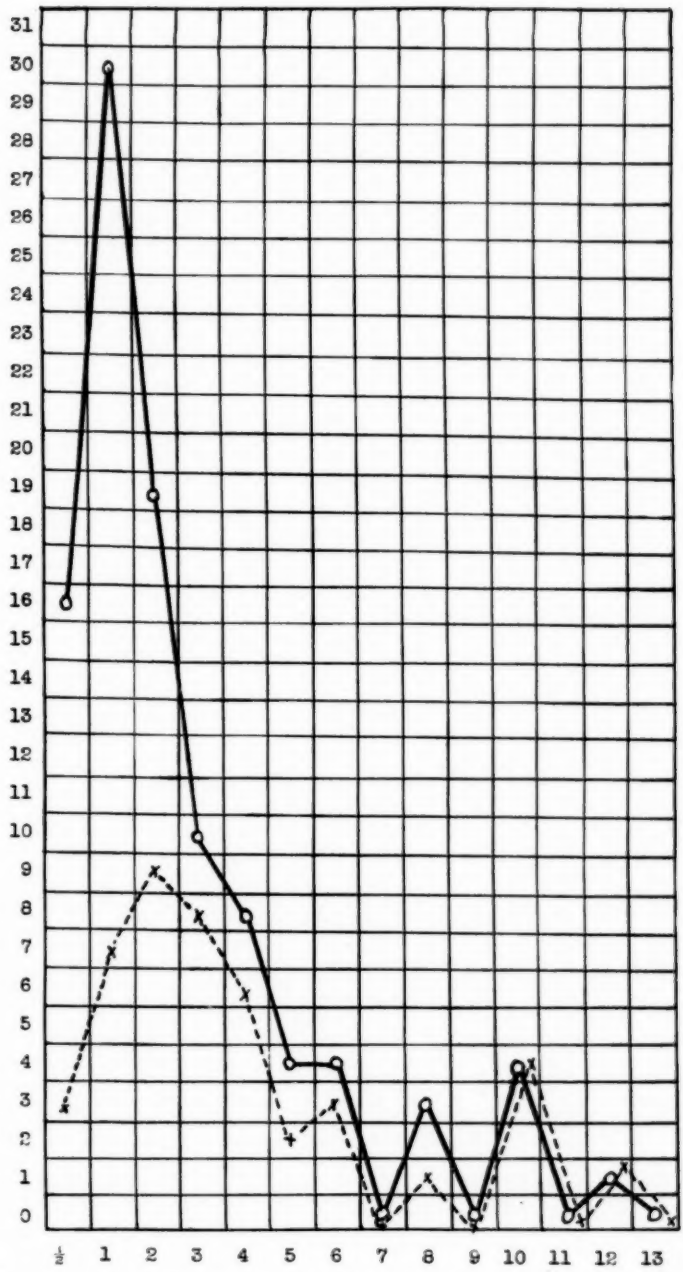


FIG. 13. Graph No. 2, showing relationship between size and number of sloughs, or potholes, and the actual number containing broods. The continuous line shows the number and size of sloughs; the broken line indicates the actual number that contained broods.

The water in the area showed a tendency to lower levels than last year. The supply may be considered as coming from two sources:

1. Those potholes and sloughs that depend mainly on the surrounding surface run-off during the spring thaw, and

2. Those sloughs and potholes that keep their level mainly by the overflooding of the creek banks at low points during the spring flood.

The following table shows the relative water levels as compared with the season of 1933.

| Total Sloughs | Total Same | | Total Lower | | Total Higher | |
|---|---|---|---|---|---|---|
| | No. | Per cent | No. | Per cent | No. | Per cent |
| 99 | 47 | 47.47 | 50 | 50.50 | 2 | 2.02 |

Those bodies of water flooded by the creek in the spring stand up to summer evaporation much better than those that receive their water from the surface run-off as is shown by the following table:

| | Creek Sloughs Same | | Creek Sloughs Lower | |
|---|---|---|---|---|
| Total Creek Sloughs | No. | Per cent | No. | Per cent |
| 21 | 14 | 66.66 | 7 | 33.33 |

| Total | Surface Run-off Same | | Surface Run-off Lower | | Surface Run-off Higher | |
|---|---|---|---|---|---|---|
| Surface Sloughs | No. | Per cent | No. | Per cent | No. | Per cent |
| 78 | 34 | 43.59 | 42 | 53.85 | 2 | 2.56 |

The spring surface run-off varies according to the spring. If the weather is mild during February and March, the snow packs and does not melt so quickly, with the result that most of the moisture goes into the ground.

To fill the surface sloughs a hard, cold winter with ample snowfall and a short, quick spring practically assures a good surface run-off. The spring of this year, 1934, was very slow, consequently the sloughs were very low, more so than they have ever been before. Seven inches of rain in June, which came in heavy storms and ran off, alleviated conditions somewhat and helped to bring some back to last year's level, two being slightly higher.

A total of 101 broods was counted, with an average of 1.02 per pothole. Actually, however, only 44 sloughs and potholes contained families. Diving ducks were much more numerous than the surface feeding species and comprised 65 of the 101 families observed; possibly this was because conditions were more favorable for them.

| Sloughs suitable for diving ducks | | Sloughs suitable for surface ducks | | Sloughs suitable for both types | |
|---|---|---|---|---|---|
| No. | Per cent | No. | Per cent | No. | Per cent |
| 57 | 57.57 | 42 | 42.42 | 16 | 16.16 |

There appeared to be a great deal of overlapping and several times it was noted that a slough or pothole classed as being a surface-feeding slough had a family of diving ducks on it. Those classed as being suitable for diving ducks had either no land cover but a good stand of S. validus or T. latifolia; or the water was considered too deep for the surface feeders. Those classed as being suited for the surface feeders had a good land cover and the food was on or near the surface. Those classed as being suited to both types had a combination of the aforementioned characteristics.

The female ducks with broods almost invariably swam out into the open water with their young behind them; only when surprised on the smaller potholes did they try to hide among the cover.

The following tables show the specific broods.

Surface Ducks

| Species | Broods | Average brood | Smallest brood | Largest brood | Percentage of surface feeders |
|---|---|---|---|---|---|
| Mallard | 5 | 6.40 | 5 | 8 | 12.95 |
| Widgeon | 5 | 7.00 | 6 | 8 | 14.89 |
| Green-winged Teal | 1 | 5.00 | 5 | 5 | 2.02 |
| Blue-winged Teal | 14 | 7.35 | 3 | 10 | 41.70 |
| Shoveller | 3 | 6.33 | 5 | 8 | 7.73 |
| Pintail | 8 | 6.63 | 3 | 9 | 21.45 |

Diving Ducks

| Species | Broods | Average brood | Smallest brood | Largest brood | Percentage of diving ducks |
|---|---|---|---|---|---|
| Redhead | 3 | 5.00 | 4 | 6 | 4.54 |
| Canvasback | 18 | 5.50 | 3 | 8 | 27.28 |
| Lesser Scaup | 19 | 7.05 | 2 | 9 | 28.78 |
| American Goldeneye | 2 | 4.50 | 4 | 5 | 3.03 |
| Bufflehead | 2 | 4.50 | 3 | 6 | 3.03 |
| Ruddy | 21 | 5.28 | 2 | 9 | 31.81 |

Percentages for Both Groups

| Species | Total young | Percentage of total young |
|---|---|---|
| Mallard | 32 | 5.12 |
| Widgeon | 35 | 5.60 |
| Green-winged Teal | 5 | .08 |
| Blue-winged Teal | 103 | 16.50 |
| Shoveller | 19 | 3.02 |
| Pintail | 53 | 8.49 |
| Redhead | 15 | 2.40 |
| Canvasback | 99 | 15.88 |
| Lesser Scaup | 134 | 21.47 |
| American Goldeneye | 9 | 1.44 |
| Bufflehead | 9 | 1.44 |
| Ruddy | 111 | 17.78 |
| Average young per brood | 6.18 | |

The Graph 2 (Fig. 13) shows the relationship between the size of the sloughs and potholes, and the actual number containing broods.

None of the sloughs or potholes appeared to be overcrowded; in one slough, covering about six acres, nine families were noted. This was the only instance where more than five families were noted on the same body of water.

Graph 3 (Fig. 14) shows the number of sloughs and the actual number of broods on each.

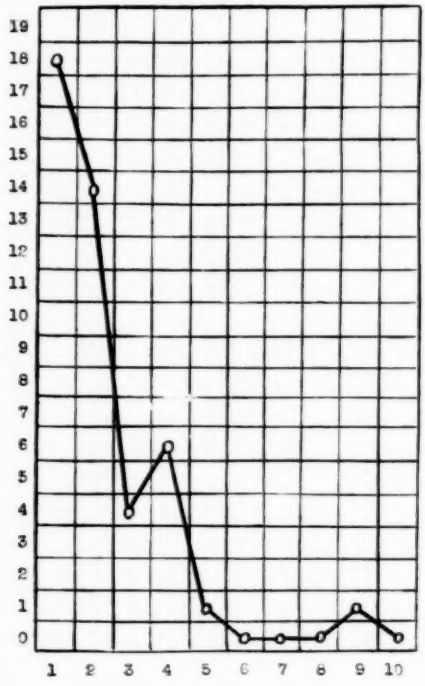


FIG. 14. Graph No. 3, showing actual number of broods. The vertical scale indicates the number of sloughs sheltering the number of broods indicated in the horizontal scale.

It will be noted that Mallards were not common. This is probably due to the time of the year that the count was made. Mallards are the earliest nesting duck in the district and it is quite common to see them with their young by May 24. This means that the earlier hatched birds are two months old by the time that this survey was made; and, if out in the water, are very difficult to separate from the adult females, particularly so if the adults are in the eclipse stage.

An estimate was made as to the probable breeding conditions for the season 1935 and it was found that after due allowance was made for surface evaporation during August and with an average winter, that conditions on the whole would be fair to normal. The normal not of ten years ago but of the last five. Out of the total of ninety-nine sloughs and potholes the situation should be about as follows:

| Good | | Fair | | Poor | |
|---|---|---|---|---|---|
| No. | Per cent | No. | Per cent | No. | Per cent |
| 52 | 52.52 | 21 | 21.21 | 26 | 26.26 |

The classification "good" includes food, water, and cover all being favorable. "Fair" includes cover and water both being favorable, and "poor" minus two of the three necessary qualities.

In conclusion, after surveying the whole situation in what is termed a very favorable area, particularly during the last five years when compared with the prairie regions, it appears that conditions were more favorable in this area for ducks to raise families than the actual number that did. It would be impossible to ascertain the exact number of broods raised; but when a large number of sloughs and potholes contained ample food, suitable cover, had a good water level, and no evidence of overcrowding noted (see Graph 3), but contained no duck broods (see Graph 2), it forces us to the conclusion that either *there were not the ducks here to breed* or that some unknown factors were working. The former reason sounds the more logical.

In making a survey of this kind it was found that two counts per season should be made. The first about the end of June when only Mallards and Pintails should be noted; and a second about the end of July to determine the other species of ducks, food, cover, and water levels. As has been stated before, Mallard broods may be noted as early as May 24, yet on July 25 of this season a Blue-winged Teal was flushed from a nest containing seven eggs.

Prince Albert, Saskatchewan.

# ERYTHROCYTES AND HEMOGLOBIN IN THE BLOOD OF SOME AMERICAN BIRDS*

BY L. B. NICE, MARGARET M. NICE, AND RUTH M. KRAFT

In Europe a number of records have been published giving the number of red corpuscles in the blood of birds. Stresemann ('27-34) states that in one cubic millimeter of avian blood there are from 1,500,000 to 5,500,000 red blood cells in contrast to 2,000,000 to 18,000,000 in mammals. He says that the number of erythrocytes within the same group varies in inverse proportion to the size of the birds, citing the following examples: Galliformes: European Quail (*Coturnix coturnix*) 4,000,000, Domestic Fowl 3,300,000, Turkey 2,300,000; Anseriformes: Australian Duck (*Anas superciliosa*) 2,800,000, Mute Swan (*Cygnus olor*) 2,150,000; Passeriformes: Waxbill (*Estrilda subflava*) 5,400,000, European Tree Sparrow (*Passer montanus*) 5,200,000, Raven (*Corvus corax*) 3,930,000.

Other records of interest are given by Ponder ('24): Carrion Crow (*Corvus corone*) 2,490,000 erythrocytes; Peregrine Falcon (*Falco peregrinus*) 2,547,000; Grey Heron (*Ardea cinerea*) 2,478,000; Spoonbill (*Platelea*) 3,400,000; White Stork (*Cinconia alba*) 2,189,000; Arabian Ostrich (*Struthio camelus*) 1,620,000.

Several studies have been made on the blood cells of domestic fowls and pigeons. Forkner ('29) reports twenty-nine counts on fowls ranging from 2,300,000 to 4,620,000 averaging 3,267,000. Landauer and David ('33) found that four cocks averaged 4,310,000 erythrocytes and five hens 3,395,000. As to pigeons, De Eds ('26-'27) found a median of 3,350,000 red blood cells in twenty-five birds. Kennedy and Climenko ('28-29) gave averages of 4,295,000 erythrocytes for five male and 3,563,000 for five female pigeons.

The most extensive and detailed work on the subject has been done by Riddle and Braucher ('34) who made 1,583 erythrocyte counts "throughout the year on suitably inbred races of the pigeon and the ring dove". Males showed higher erythrocyte counts at all seasons than females. "Mean values were 3,228,000 in males and 3,096,000 in females (pigeons); and 3,045,000 in males and 2,989,000 in females (doves)". "Highest erythrocyte counts were found in autumn, lowest in summer. In pigeons the autumn excess is 10 per cent; in doves 9.4 per cent."

Since no work of this nature seems to have been done on native American birds, we decided to determine the number of erythrocytes

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and amount of hemoglobin in some of the species which were being caught for banding purposes.

The subjects were taken to the laboratory in collecting cages covered with a dark cloth and kept for about an hour, so that they might recover from their excitement. A drop or two of blood was then obtained by puncturing a radial wing vein with a needle. The blood was drawn up to the .05 mark in a standardized pipette and diluted with eosin in Ringer Solution. After letting the blood in the pipette stand for some time and then carefully mixing it by shaking, the erythrocytes were counted on a double Neubauer ruled hemocytometer. In all cases double check counts were made, and in the event of disagreement, repetitions were made until they did check.

## Results

A summary of our findings on eighty-six birds of sixteen species examined from October to May are shown in Table I.

It will be seen that the number of erythrocytes in the Passerine species averaged from 4,200,000 to 6,055,000; the lowest individual count being 3,930,000 (Tufted Titmouse), and the highest 7,645,000 (Junco). The median count of all the birds was 5,230,000 (Lincoln Sparrow). There is a wide range between the counts of individuals in the same species in some cases, yet with the exception of the single Towhee (a female) the average counts of the Fringillidae fall close together. The nine Song Sparrows gave somewhat lower results than the others. Among the other Passerines there is a wider range, but the representatives of each species are small in number. The three Tufted Titmice gave low counts and the three Cowbirds high counts.

As to the comparative size of these fifteen Passerine species, the smallest bird (Chipping Sparrow) weighed fourteen grams, while the heaviest (Grackle) weighed ninety-nine grams, seven times as much. The three heaviest of the Passerines (Grackle, Thrasher, and Cowbird) all have blood counts well above the median. There is no evidence from our results that there is an inverse relationship between size of bird and the number of erythrocytes. Probably this relation holds only with marked differences in size.

The three Bob-whites (all females) had a decidedly lower blood count than did the Passerines. This is in keeping with the findings of European workers.

We found no consistent difference between the counts in males and females. Perhaps larger numbers would have shown a difference. Neither did there appear to be differences between migrating and non-migrating birds. As to season, counts in the fall and winter with

## Table I

### Average Number of Erythrocytes per Cubic Millimeter of Blood.

M=Male. F=Female.

| Passeriformes | Red Blood Corpuscles | |
|---|---|---|
| **Fringillidae** | Averages | Range |
| 28 White-throated Sparrows (Zonotrichia albicollis) | 5272000 | 4010000 -6770000 |
| 18 Juncos (Junco hyemalis) | 5567000 | 4495000(F) -7645000(M) |
| 9 Song Sparrows (Melospiza melodia) | 4846000 | 4460000 -5225000 |
| 4 White-crowned Sparrows (Zonotrichia leucophrys) | 5213000 | 4640000 -5690000 |
| 1 Tree Sparrow (Spizella arborea) | 5610000 | |
| 1 Chipping Sparrow (Spizella passerina) | 5530000 | |
| 1 Lincoln Sparrow (Melospiza lincolni) | 5230000 | |
| 4 Cardinals (Richmondena cardinalis) | 5123000 | 4488000(M) -5605000(F) |
| 1 Towhee (Pipilo erythrophthalmus) | 4200000 | |
| **Ploceidae** | | |
| 6 House Sparrows (Passer domesticus) | 5182000 | 4231000 -5769000 |
| **Paridae** | | |
| 3 Tufted Titmice (Baeolophus bicolor) | 4368000 | 3930000 -4685000 |
| **Icteridae** | | |
| 3 Cowbirds (Molothrus ater) | 6055000 | 5420000(F) -6690000(F) |
| 1 Bronzed Grackle (Quiscalus q. aeneus) | 5405000 | |
| **Mimidae** | | |
| 1 Brown Thrasher (Toxostoma rufum) | 5904000 | |
| **Turdidae** | | |
| 1 Hermit Thrush (Hylocichla guttata) | 4810000 | |
| **Galliformes** | | |
| 3 Bob-whites (Colinus virginianus) | 3532000 | 3080000(F) -3805000(F) |

Juncos and Song Sparrows; in the winter and spring with Cardinals; and in the fall and spring with White-Throats, showed no consistent differences.

As to the hemoglobin content, Stresemann says that in birds it appears to be less than in mammals, "at least the dry substance of the erythrocytes in the goose consists of only 62.65 per cent of hemoglobin, in contrast to 94.3 per cent in man and 86 per cent in the dog (Hoppe-Seyler)". In comparison to these figures our hemoglobin results with the Sahli method were consistently higher. In White-Throated Sparrows in October and November it varied between 75 and 90 per cent, while with fifteen of the twenty cases it amounted to 80 per cent. In nine Juncos in the fall the counts ranged between 80 and 95 per cent, five cases amounting to 80 per cent. The Chipping Sparrow reached 75 per cent; five House Sparrows, three Song Sparrows, and a Hermit Thrush had 80 per cent, all taken in October. The three female Bob-whites varied more: one on October 31, 60 per cent, two, November 13, 80 and 100 per cent respectively. All birds were released a short time after a few drops of blood were secured from a radial wing vein for the erythrocyte and hemoglobin determinations.

In the later experiments the more accurate Newcomer method which gives the number of grams of hemoglobin per 100 c. c. of blood was used. Our results on seven species are shown in Table II. These figures are within the same range as found for human blood.

TABLE II

Hemoglobin in Grams per 100 Cubic Centimeters of Blood.

| Bird | Erythrocytes | Hemoglobin | Bird | Erythrocytes | Hemoglobin |
|---|---|---|---|---|---|
| White-throated Sparrow | | | Towhee | | |
| April 26 | 5,130,000 | 13.1 | May 5 F | 4,200,000 | 15.8 |
| April 26 | 5,395,000 | 13.9 | Tufted Titmouse | | |
| May 4 | 4,425,000 | 13.2 | December 9 | 4,685,000 | 13.3 |
| Junco | | | February 20 | 4,490,000 | 13.6 |
| December 8 M. | 7,645,000 | 16.9 | | | |
| December 9 M. | 6,290,000 | 14.5 | Bronzed Grackle | | |
| December 9 M. | 5,783,000 | 14.7 | December 8 M. | 5,405,000 | 16.5 |
| Cardinal | | | Brown Thrasher | | |
| December 15 F. | 5,540,000 | 15.7 | April 11 | 5,904,000 | 16.0 |
| February 6 M. | 4,488,000 | 17.9 | | | |

Riddle and Braucher ('34) made 931 hemoglobin measurements on their pigeons and doves, and found that males of both species had a higher concentration at all seasons than the females. "Mean values were 15.97 grams in males and 14.72 grams in females (pigeons); and

14.56 grams in males and 13.97 grams in females (doves)." "Hemoglobin values were highest in winter—when the birds were exposed neither to air of greatest cooling power (autumn) nor to ultra-violet light. Lowest values were found in summer—when in air of least cooling power and well exposed to ultra-violet rays."

## Summary

The number of erythrocytes per cubic millimeter of blood was determined in fifteen species of Passerine and one species of Gallinaceous birds.

The lowest number found for a Passerine bird was 3,930,000 in a Tufted Titmouse and the highest 7,645,000 in a Junco. The median of the eighty-three counts was 5,230,000.

The one Gallinaceous bird (the Bob-white) averaged 3,532,000

The hemoglobin in seven species of Passerine birds varied between 13.3 and 17.9 grams per 100 cubic centimeters of blood for a Titmouse and Cardinal respectively.

## Bibliography

De Eds, F. 1926-27. Normal Blood Counts in Pigeons. J. Lab. Clin. Med., 12, 437.

Forkner, C. E., 1929. Blood and Bone Marrow Cells of the Domestic Fowl. J. Exp. Med. 50, 121-142.

Kennedy, W. P. and D. R. Climenko. 1928-29. Studies on the blood of Birds. I. The Corpuscles of the Pigeon. Quart. J. Exp. Physiol. 19, 43.

Landauer, W. and L. T. David. 1933. Elevated Metabolism, Blood Cells, and Hemoglobin Content of the Blood in the Frizzle Fowl. Folia Haemotologica, 50, 1-14.

Ponder, E. 1924. Erythrocytes and the Action of Simple Haemolysis. Oliver and Boyd. Edinburgh.

Riddle, O. and P. F. Braucher. 1934. Hemoglobin and Erythrocyte Differences According to Sex and Season in Doves and Pigeons. Am. J. Physiology, 108, 554-566.

Stresemann, E. 1927-1934. Aves. Kuckenthal-Krumbach, Handb. Zool. Bd. VII, 2. Hälfte, p. 224.

Columbus, Ohio.

# FOOD HABITS OF BURROWING OWLS IN NORTHWESTERN IOWA*

BY PAUL L. ERRINGTON AND LOGAN J. BENNETT

Incidental to the 1933 summer studies carried on at the Iowa State College wild life research station, at Ruthven, Iowa, pellet collections were gathered from local burrowing owl (*Speotyto cunicularia hypugaea* Bonaparte) colonies encountered. Analyses of these pellets revealed considerable variations in proportions of vertebrate to invertebrate prey.

Beetles comprised the greater part of the invertebrate prey, including ground beetles (Carabidae and *Harpalus* in particular), dung beetles (*Canthon, Copris, Geotrupes*), water beetles (*Hydrophilus*), carrion beetles (*Necrophorus, Silpha*), click beetles (*Melanotus*), tiger beetles (*Canthon, Corpis, Geotrupes*), water beetles (*Hydrophilus*), *plus*) made up most of the balance.

Vertebrate prey was of relatively few types: meadow mice (*Microtus*), deer mice (*Peromyscus*), harvest mice (*Reithrodontomys*), jumping mice (*Zapus*), house mice (*Mus*), ground squirrels (*Citellus*), frogs, small birds.

Area "A". Twenty miles sowthwest of Ruthven. Colony of undetermined number of owls visited but once. Late June and early July—9 pellets. Contents: deer mouse, 1; mouse (*Reithrodontomys?*), 1; horned lark (*Otocoris alpestris*), 1; insects, as follows: *Bolbocerosoma*, 16; *Canthon*, 13; *Hydrophilus*, 1; *Harpalus*, 16; *Ligyrus*, 3; *Melanoplus*, 2.

Area "B". One and a half miles southeast of Ruthven. A maximum of 13 owls frequenting holes in a pasture once a golf course was to be seen.

Late June and early July—bulk material representing about 30 pellets. Meadow mouse, 9; deer mouse, 13; frog, 7; insects: *Copris*, 3; *Melanotus*, 1; *Harpalus*, 11; *Anisodactylus*, 1; *Pasimachus*, 3; unidentified Coleoptera, 2.

Mid-July—21 pellets. Meadow mouse, 16; deer mouse, 7; few unidentified feathers in one pellet; frog, 5; insects: *Geotrupes*, 1; *Copris*, 4; *Canthon*, 1; *Silpha*, 1; *Hydrophilus*, 1; *Harpalus*, 28; *Anisodactylus*, 5; *Cicindela*, 1; unidentifed Coleoptera, 1; *Melanoplus*, 1.

Late July—6 pellets. Meadow mouse, 5; deer mouse, 1; insects: *Hydrophilus*, 1; *Harpalus*, 23; unidentified Coleoptera, 1; *Melanoplus*, 1.

First week of August—5 pellets. Meadow mouse 3; deer mouse, 3; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Necrophorus*, 1; *Harpalus*, 17; *Pasimachus*, 2; unidentified Coleoptera, 1.

Second week of August—9 pellets. Deer mouse, 3; insects: *Ves-*

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*pidae* (Wasps), 9; *Scarab*, 1; *Scarites*, 23; *Harpalus*, 37; unidentified Carabidae, 45; *Melanoplus*, 3.

Third week of August—7 pellets. Deer mouse, 1; frog, 1; insects: unidentified *Tenebrionidae*, 2; *Bolbocerosoma*, 2; *Copris*, 1; *Canthon*, 2; *Harpalus*, 10; unidentified Carabidae, 80; *Melanoplus*, 3.

Last week of August—9 pellets. Meadow mouse, 1; deer mouse, 3; insects: *Eleodes*, 3; unidentified *Tenebrionidae*, 4; *Harpalus*, 2; *Pasimachus*, 1; unidentified Carabidae, 148; *Melanoplus*, 7.

Early September—16 pellets. Meadow mouse, 2; deer mouse, 10; house mouse (*Mus*), 1; unidentified small bird, 1; frog, 5; insects: unidentified *Tenebrionidae*, 1; *Tigyrodeus*, 1; *Bolbocerosoma*, 2; *Canthon*, 5; *Harpalus*, 4; unidentified Carabidae, 38.

Mid-September—2 pellets. Deer mouse, 1; house mouse, 1; insects: *Eleodes*, 1; unidentified Carabidae, 1.

Area "C". Two and a half miles southwest of Ruthven. Seven owls in pasture, of which some were doubtless juvenals.

Late June—about 20 pellets gathered in bulk. Juvenile striped ground squirrel (*Citellus tridecemlineatus*), 2; meadow mouse, 10; deer mouse, 8; frog, 1; insects: *Canthon*, 3; *Necrophorus*, 1; *Ligyrus*, 1; *Cicindela*, 1; unidentified Carabidae, 3.

Early July—19 pellets. Meadow mouse, 11; deer mouse, 10; jumping mouse (*Zapus*), 1; unidentified mice, 2; Maryland yellowthroat (*Geothlypus trichas*), 1; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 3; *Chrysobothris*, 2; *Necrophorus*, 2; *Hydrophilus*, 2; *Calosoma*, 1; *Pterostichus*, 1; *Harpalus*, 1; unidentified Carabidae, 1; unidentified Coleoptera, 1.

Mid-July—6 pellets. Meadow mouse, 4; deer mouse, 3; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Necrophorus*, 1; *Hydrophilus*, 2.

Late July—5 pellets. Deer mouse 3; mouse (*Reithrodontomys?*), 1; field sparrow (*Spizella pusilla*), 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Hydrophilus*, 2; *Pasimachus*, 2; *Harpalus*, 22; unidentified Carabidae, 6; *Melanoplus*, 1.

Early August—2 pellets. Insects: unidentified Tenebrionidae, 1; *Bolbocerosoma*, 2; *Canthon*, 1; unidentified Carabidae, 15; unidentified Coleoptera, 2; *Melanoplus*, 1.

Area "D". One-half mile west of Ruthven. Five owls seen in vicinity of a hole that had the appearance of a breeding den.

Mid-July—11 pellets. Meadow mouse, 2; deer mouse, 8; harvest mouse, 1; mouse (*Peromyscus?*), 1; frog, 4; insects: *Phyllophaga*, 1; *Harpalus*, 18; *Pasimachus*, 2; *Melanoplus*, 5.

Late July—6 pellets. Meadow mouse, 9; deer mouse, 3; insects: *Harpalus*, 3; unidentified Coleoptera, 1; *Melanoplus*, 1; *Gryllus*, 1.

August 13—1 pellet. Insects: *Canthon*, 1; unidentified Carabidae, 7.

August 20—3 pellets. Insects: *Eleodes*, 3; other Tenebrionidae, 4; *Bolbocerosoma*, 2; *Canthon*, 1; unidentified Carabidae, 11; *Melanoplus*, 3.

Area "E". Two miles west of Ruthven. A few owls moved into a badger digging and stayed for a time.

Mid-August to early September—5 pellets. Deer mouse, 2; frog (?), 1; insects: *Bolbocerosoma*, 2; *Canthon*, 1; *Anisodactylus*, 3; *Harpalus*, 2; unidentified Carabidae, 34; unidentified Coleoptera, 3; *Melanoplus*, 5.

The food habits of these owls may be presumed to reflect a certain availability of prey, as do predator food habits on the whole. Mice, young ground squirrels, small birds, frogs, and insects may be taken in numbers varying with the season and the locality. Just how much the summer's growth of cover and the increasing pressure of livestock on pasture lands affected the availability of Burrowing Owl prey is not evident.

Data from the areas collectively, with the exception of those from "A", showed strongly vertebrate diet from late June to early August, from which time until September insects chiefly were taken. The limited September pellet collections revealed a swing upward to vertebrate prey again. The vertebrate prey was represented mainly by mice, with a scattering representation of small birds, and an irregular occurrence of frogs throughout the summer. Incidence of frogs as well as of mice rose abruptly for early September, the significance of which is weakened by the departure of the owls and the consequent lack of later pellets.

In an attempt to derive more meaning from pellet analyses, let us review changes in prey types according to dates and areas. The incidence of individuals of vertebrate prey per average pellet should provide an index as to importance; the insects, however, are so much smaller than the vertebrates and vary so much in size that listing their occurrence numerically may not be of equal value.

For area "A", vertebrates (two mice and a small bird) were found in a third of the nine late June and early July pellets. This leaves two-thirds of the pellets made up entirely of insects. None of the owls of other areas fed upon such a high proportion of insects so early in the season.

## Data Tabulated for Other Areas

### Area "B"

| Date | No. of pellets | Vertebrates per pellet | Vertebrate ratios | Average No. insects per pellet |
|---|---|---|---|---|
| Late June and early July | 30 | .97 | 22 mice, 7 frogs | .7 |
| Mid-July | 21 | 1.38 | 23 mice, 5 frogs, 1 bird | 2.1 |
| Late July | 6 | 1.0 | 6 mice | 4.3 |
| First week August | 5 | 1.4 | 6 mice, 1 frog | 4.6 |
| Second week August | 9 | .33 | 3 mice | 12.0 |
| Third week August | 7 | .28 | 1 mouse, 1 frog | 14.3 |
| Fourth week August | 9 | .44 | 4 mice | 18.3 |
| First week September | 16 | 1.19 | 13 mice, 5 frogs, 1 bird | 5.4 |
| Second week September | 2 | 1.0 | 2 mice | 1.0 |

AREA "C"

| Date | No. of pellets | Vertebrates per pellet | Vertebrate ratios | Average No. insects per pellet |
|---|---|---|---|---|
| Late June and early July | 39 | 1.2 | 42 mice, 2 stripped ground squirrels, 2 frogs, 1 bird | .7 |
| Mid-July | 6 | 1.33 | 7 mice, 1 frog | .8 |
| Late July | 5 | 1.0 | 4 mice, 1 bird | 7.0 |
| First week August | 2 | 0.0 | | 11.0 |

AREA "D"

| Date | No. of pellets | Vertebrates per pellet | Vertebrate ratios | Average No. insects per pellet |
|---|---|---|---|---|
| Mid-July | 11 | 1.45 | 12 mice, 4 frogs | 2.4 |
| Late July | 6 | 2.0 | 12 mice | 1.0 |
| Second week August | 1 | 0.0 | | 8.0 |
| Third week August | 3 | 0.0 | | 8.0 |

AREA "E"

| Date | No. of pellets | Vertebrates per pellet | Vertebrate ratios | Average No. insects per pellet |
|---|---|---|---|---|
| Fourth week August | 5 | .6 | 2 mice, 1 frog | 10.0 |

The simple explanation for the August ascendancy of insect prey may be, of course, that the owls merely responded to rising insect populations which by reason of their greater numbers became more convenient to feed upon than vertebrates. On the other hand, the relatively high availability of the insects may be correlated with the "weaning" of young owls by the parent birds.

The horned owl (see Errington, Paul L. "Studies on the behavior of the great horned owl", WILSON BULLETIN, XLIV, December, 1932, pp. 212-220) completes the "weaning" of its young about the first part of August. Prior to this time the food eaten by the young is prey furnished to a diminishing extent by adults; thereafter, the young have to look out for themselves and they do not immediately find hunting so easy, judging from their hunger calls in the woods. Barred owl and screech owl young, too, appear to be self-hunting by August, and this conceivably may hold true for other owls, including the burrowing owl.

Only a little better than a third of the pellets for the last three weeks of August contained vertebrates. It was our general impression that about a third of the owls seen were adults. Hence, the temptation is to suspect that the adults were the owls taking the vertebrates, while the clumsy youngsters, not being adept enough at this stage to catch their own mice and frogs and not being able to live off the old ones any more, had to eat insects and similar slow, small prey or nothing at all. A darting mouse may be unavailable to a young owl, but it doesn't require any great skill to pick up dung beetles.

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# BIRD MIGRATION RECORDS FROM SOUTHEASTERN WYOMING

BY OTTO C. McCREARY AND ARTHUR B. MICKEY

In our study we have found it convenient to divide the birds occurring in southeastern Wyoming into four groups: I. Permanent residents. In some cases these have vertical migration on the mountain sides. However, few if any leave the region. II. Birds that are partially migratory, but which are represented in this region throughout the year by at least some individuals. III. Accidental, casual, rare, extinct, or other birds which have been recorded from this portion of the state without dates or with dates which have little or no value as migration records. IV. Migratory birds for which we have dates giving some information concerning their movements.

The names of the birds found in this region are accordingly listed in the four groups just explained.

I. Permanent residents: Golden Eagle, *Aquila chrysaëtos canadensis;* Dusky Grouse, *Dendragapus obscurus obscurus;* Southern White-tailed Ptarmigan, *Lagopus leucurus altipetens;* Columbian Sharp-tailed Grouse, *Pedioecetes phasianellus columbianus;* Prairie Sharp-tailed Grouse, *Pedioecetes phasianellus campestris;* Sage Hen, *Centrocercus urophasianus;* Eastern Bob-white, *Colinus virginianus virginianus;* Ring-necked Pheasant, *Phasianus colchicus torquatus;* Rocky Mountain Screech Owl, *Otus asio maxwelliae;* Montana Horned Owl, *Bubo virginianus occidentalis;* Long-eared Owl, *Asio wilsonianus;* Saw-whet Owl, *Cryptoglaux acadica acadica;* Rocky Mountain Hairy Woodpecker, *Dryobates villosus monticola;* Batchelder's Woodpecker, *Dryobates pubescens leucurus;* Alpine Three-toed Woodpecker, *Picoides tridactylus dorsalis;* Rocky Mountain Jay, *Perisoreus canadensis capitalis;* Black-headed Jay, *Cyanocitta stelleri annectens;* Long-crested Jay, *Cyanocitta stelleri diademata;* American Magpie, *Pica pica hudsonia;* Clark's Nutcracker, *Nucifraga columbiana;* Long-tailed Chickadee, *Penthestes atricapillus septentrionalis;* Mountain Chickadee, *Penthestes gambeli gambeli;* Rocky Mountain Nuthatch, *Sitta carolinensis nelsoni;* Dipper, *Cinclus mexicanus unicolor;* English Sparrow, *Passer domesticus domesticus;* and Rocky Mountain Pine Grosbeak, *Pinicola enucleator montana.*

II. Partially migratory birds: Common Mallard, *Anas platyrhynchos platyrhynchos;* Green-winged Teal, *Nettion carolinense;* Barrow's Golden-eye, *Glaucionetta islandica;* American Merganser, *Mergus merganser americanus;* Ferruginous Rough-leg, *Buteo regalis;* Marsh Hawk, *Circus hudsonius;* Prairie Falcon, *Falco mexicanus;* Wilson's Snipe, *Capella delicata;* Eastern Belted Kingfisher, *Megaceryle alycon*

*alycon;* Red-shafted Flicker, *Colaptes cafer collaris;* Desert Horned Lark, *Otocoris alpestris leucolaema;* Saskatchewan Horned Lark, *Otocoris alpestris enthymia;* Piñon Jay, *Cyanocephalus cyanocephalus;* Red-breasted Nuthatch, *Sitta canadensis;* Rocky Mountain Creeper, *Certhia familiaris montana;* Townsend's Solitaire, *Myadestes townsendi;* Western Meadowlark, *Sturnella neglecta;* Thick-billed Redwing, *Agelaius phoeniceus fortis;* Western Evening Grosbeak, *Hesperiphona vespertina brooksi;* Common House Finch, *Carpodacus mexicanus frontalis;* Northern Pine Siskin, *Spinus pinus pinus;* Pale Goldfinch, *Spinus tristis pallidus;* Bendire's Crossbill, *Loxia curvirostra bendirei;* and Mountain Song Sparrow, *Melospiza melodia fallax.*

III. Accidental, casual, rare, extinct, or other birds for which we do not have adequate migration records: Eastern Brown Pelican, *Pelecanus occidentalis occidentalis* (7); Eastern Green Heron, *Butorides virescens virescens;* Eastern Least Bittern, *Ixobrychus exilis exilis* (23); Trumpeter Swan, *Cygnus buccinator* (23); Hutchin's Goose, *Branta canadensis hutchinsi* (23); Black Brant, *Branta nigricans;* White-fronted Goose, *Anser albifrons albifrons* (23); Lesser Snow Goose, *Chen hyperborea hyperborea;* European Widgeon, *Mareca penelope* (21); Wood Duck, *Aix sponsa* (23); American Scoter, *Oidemia americana* (23); Hooded Merganser, *Lophodytes cucullatus* (23); Bald Eagle, *Haliaeetus leucocephalus* ssp.; Osprey, *Pandion haliaëtus carolinensis;* Greater Prairie Chicken, *Tympanuchus cupido americanus;* California Gull, *Larus californicus* (21); Short-billed Gull, *Larus canus brachyrhynchus* (21); Sabine's Gull, *Xema sabini* (21); Common Tern, *Sterna hirundo hirundo* (23); Passenger Pigeon, *Ectopistes migratorius* (2); Yellow-billed Cuckoo, *Coccyzus americanus americanus* (21); Snowy Owl, *Nyctea nyctea* (23); Northern Flicker, *Colaptes auratus luteus;* Natalie's Sapsucker, *Sphyrapicus thyroideus nataliae;* Northern Crested Flycatcher, *Myiarchus crinitus boreus* (23); Ash-throated Flycatcher, *Myiarchus cinerascens cinerascens* (23); Purple Martin, *Progne subis subis;* Woodhouse's Jay, *Aphelocoma californica woodhousei* (21); American Raven, *Corvus corax sinuatus;* Short-billed Marsh Wren, *Cistothorus stellaris* (23); Eastern Bluebird, *Sialia sialis sialis;* Chestnut-backed Bluebird, *Sialia mexicana bairdi;* Gnatcatcher, *Polioptila caerulea* ssp.; Black-throated Blue Warbler, *Dendroica caerulescens caerulescens* (21); Bicolored Red-wing, *Agelaius phoeniceus californicus* (11); Scarlet Tanager, *Piranga erythromelas* (6); Dickcissel, *Spiza americana;* Black Rosy Finch, *Leucosticte atrata* (23); Brown-capped Rosy Finch, *Leucosticte australis;* and White-winged Crossbill, *Loxia leucoptera* (19).

IV. Migratory birds, for which we have the following records:

Lesser Loon. *Gavia immer elasson.* Transient. Earliest spring record: April 21, 1934, Lake Hattie (Mickey). Average of first spring records, four years: April 30. Latest spring record: one found a few hours after it had been killed, June 11, 1933, Rex Lake, Albany County (R. O. Westley). Earliest fall record: one collected October 22, 1933, Carroll Lakes (H. Thomas). Latest fall record: November 12, 1932, Lake Hattie (H. Thomas).

Holboell's Grebe. *Colymbus grisegena holboelli.* Transient. We have only three records with dates: June 10, 1928, Lake Hattie (McCreary); June 12, 1929, Torrington (McCreary); and one specimen taken October 18, 1893, Douglas (Jeserun) (23).

Horned Grebe. *Colymbus auritus.* Transient. Two records of specimens taken: May 15, 1876, near Ft. Sanders (Brackett) (9); and September 6, 1923, near Wheatland (Fuller) (20).

Eared Grebe. *Colymbus nigricollis californicus.* Earliest spring record: April 18, 1930, Hutton Lake (McCreary). Average of first spring records, nine years: April 26. Average of last fall records, eight years: November 16. Latest fall record: December 4, 1932, Laramie City Reservoir (McCreary).

Western Grebe. *Aechmophorus occidentalis.* Exceptionally early spring record: one seen April 14, 1934, Hutton Lake (Mickey). Average of first spring records, three other years (May 6-14): May 10. Average of last fall records, four years: October 12. Latest fall record: October 25, 1930, Hutton Lake (McCreary).

Pied-billed Grebe. *Podilymbus podiceps podiceps.* Earliest spring record: April 11, 1931, Hutton Lake (McCreary). Average of first spring records, six years: April 27. Latest fall record: October 25, 1930, Hutton Lake (McCreary).

White Pelican. *Pelecanus erythrorhynchos.* Transient. Earliest spring record: April 29, 1933, Creighton Lake (Mickey). Latest spring record: one taken May 9, 1875, Hutton Lake (Brackett) (9). Earliest fall record: twelve seen August 29, 1925, ten miles northwest of Rock River (J. W. Scott). Latest fall record: October 7, 1934, Hutton Lake (Mickey).

Double-crested Cormorant. *Phalacrocorax auritus auritus.* Transient. Earliest spring record: May 7, 1930, Twin Buttes Lake, Albany County (McCreary). Latest spring record: June 24, 1928, Bamforth Lake (McCreary). Earliest fall record: August 6, 1933, Wheatland Reservoir (McCreary). Latest fall record: October 26, 1930, Hutton Lake (McCreary).

Treganza's Heron. *Ardea herodias treganzai.* Earliest spring record: March 26, 1932, Laramie (Thomas and Nelson). Average of first spring records, eleven years: April 3. Average of last fall records, ten years: October 5. Latest fall record: November 2, 1927, Wheatland (J. Neilson) (26).

Brewster's Egret. *Egretta thula brewsteri.* Earliest spring record: one taken about May 1, 1902, Sportsman's Lake, Albany County (Lindsey) (23). Average of spring records, five years, May 16. Our latest record is July 28, 1929, Torrington (McCreary).

Black-crowned Night Heron. *Nycticorax nycticorax hoactli.* Earliest spring record: April 10, 1927, Laramie (McCreary). Average of first spring records, nine years: April 17. Average of last fall records, seven years: October 1. Latest fall record: October 21, 1933, Laramie (McCreary).

American Bittern. *Botaurus lentiginosus.* Earliest spring record: one taken April 23, 1875, Fort Sanders, Albany County (Brackett) (8). Average of first spring records, three years: April 25. Latest fall record: October 19, 1930, Torrington (McCreary).

White-faced Glossy Ibis. *Plegadis guarauna.* Two records: one taken May 20, 1910, Hat Creek, Niobrara County (G. D. Percival) (21); and one seen July 11, 1933, Hutton Lake (Mr. and Mrs. Mickey).

Whistling Swan. *Cygnus columbianus.* Transient. Horace Thomas reports seeing this bird in the spring but we do not have the dates. Earliest fall record: October 25, 1930, Lake Hattie. Average of first fall records, three years: November 3. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

Canada Goose. *Branta canadensis* ssp. The records given are sight records and may include both of the two subspecies (*canadensis* and *hutchinsi*) migrating through this region. Earliest spring record: about fifty seen March 29, 1928, Laramie (McCreary). Average of first spring records, three years: April 5. Average of last fall records, three years: November 15. Latest fall records: November 24, 1932, Lake Hattie (McCreary). One winter record: January 2, 1928, Laramie River, Albany County (McCreary). James Neilson (26) reports seeing them in winter near Wheatland.

Black Duck. *Anas rubripes* ssp. There are three spring records: one taken April 12, 1875, Ft. Sanders, Albany County (Brackett) (8); one seen May 12, 1929, Cheyenne (J. Gundlach); and one seen May 15, 1934, Bamforth Lake (McCreary). A. G. Burckert reports taking this duck in the fall at Sodergreen Lake, Albany County.

GADWALL. *Chaulelasmus streperus.* Earliest spring record: March 14, 1933, Laramie (McCreary). Average of first spring records, nine years: March 30. Average of last fall records, five years, November 15. Latest fall record: November 30, 1933, Twelvemile Lake (McCreary). We have one winter record: December 26, 1928, Torrington (McCreary).

BALDPATE. *Mareca americana.* Earliest spring record: March 25, 1934, Ninemile Lake (Mickey). Average of first spring records, nine years: April 7. Average of last fall records, six years: November 20. Latest fall record: one taken December 6, 1927, Laramie (A. McIntosh). Winter records: January 1, 1930, Torrington, and December 31, 1933, Lake Hattie (McCreary).

AMERICAN PINTAIL. *Dafila acuta tzitzihoa.* Occasionally seen in winter. Small flocks arrive in March. Earliest: February 28, 1932, Lake Hattie (E. Lovejoy). Large flocks arrive in late March or early April. Average of last autumn records, four years: November 15.

BLUE-WINGED TEAL. *Querquedula discors.* Earliest spring records: April 15, 1933, Laramie (Mickey); and April 15, 1934, Hutton Lake (Mickey). Average of first spring records, 10 years: April 25. Latest fall record: October 21, 1928, Laramie Plains (McCreary).

CINNAMON TEAL. *Querquedula cyanoptera.* Earliest spring record: April 2, 1933, Creighton Lake (Mickey). Average of first spring records, ten years: April 15. Latest fall record: October 9, 1927, Bamforth Lake (McCreary).

SHOVELER. *Spatula clypeata.* Exceptionally early spring record: February 26, 1928, Wheatland Flats (McCreary). Average of first spring records, nine other years (March 25-April 16): April 5. Average of last fall records, five years: November 15. Latest fall records: November 26, 1932 and 1933, Bamforth Lake (McCreary).

REDHEAD. *Nyroca americana.* Earliest spring record: February 28, 1932, Lake Hattie (E. Lovejoy). Average of first spring records nine years: March 23. Average of last fall records, five years: November 11. Latest fall record: November 19, 1933, Lake Hattie (McCreary). One winter record: February 4, 1934, Wheatland Flats on irrigation reservoir (McCreary).

RING-NECKED DUCK. *Nyroca collaris.* Earliest spring record: April 14, 1934, Hutton Lake (Mickey). Average of last fall records six years, November 12. Latest fall record: December 3, 1932, Twelvemile Lake (McCreary). Winter records: December 30 and 31, 1928 Platte River near Guernsey (McCreary).

CANVAS-BACK. *Nyroca valisineria.* Earliest spring records: April 2, 1933, Soda Lakes (McCreary); and April 2, 1934, Carroll Lakes (McCreary). Average of first spring records, seven years: April 6. Average of last fall records, four years: November 15. Latest fall record: November 30, 1933, Bamforth Lake (H. Thomas).

GREATER SCAUP DUCK. *Nyroca marila.* Transient. Earliest spring record: April 2, 1934, Carroll Lakes (McCreary). Average of first spring records, three years: April 6. Latest spring record: one collected April 12, 1875, Ft. Sanders, Albany County (Brackett) (8). One fall record: October 25, 1930, Hutton Lake (McCreary).

LESSER SCAUP DUCK. *Nyroca affinis.* Earliest spring records: one collected March 25, 1928, Sevenmile Lake (A. McIntosh); and forty seen March 25, 1934, Ninemile and Twelvemile Lakes (Mickey). Average of first spring records, nine years: April 1. Average of last fall records, six years: November 19. Latest fall record: December 10, 1933, Twelvemile Lake (R. Honess).

AMERICAN GOLDEN-EYE. *Glaucionetta clangula americana.* Winter visitant. Earliest fall record: November 5, 1933, Laramie City Reservoir (Mickey). Average of first fall records, two years: November 9. Average of last spring records, two years: May 11. Latest spring record: May 12, 1929, Cheyenne (J. Gundlach).

BUFFLE-HEAD. *Charitonetta albeola.* Transient. Earliest spring record: April 16, 1933, Twelvemile Lake (Mickey). Average of first spring records, six years: April 20. Average of last spring records, two years: May 15. Latest spring record: May 17, 1932, Hawk Springs Reservoir (McCreary). Earliest fall record: October 3, 1926, Ninemile Lake (McCreary). Average of first fall records, six years: October 17. Average of last fall records, six years: November 6. One winter record: three seen January 1, 1934, Lake Hattie (McCreary).

WHITE-WINGED SCOTER. *Melanitta deglandi.* Transient. One spring record: May 15, 1934, Bamforth Lake (McCreary). Earliest fall record: one taken November 3, 1934, Carroll Lakes (H. Gilbert). Latest fall record: one taken November 11, 1934, Wheatland Reservoir.

SURF SCOTER. *Melanitta perspicillata.* One collected October 19, 1893, Douglas (Jeserun) (23).

RUDDY DUCK. *Erismatura jamaicensis rubida.* Earliest spring record: April 6, 1930, Soda Lakes (McCreary). Average of first spring records, seven years: April 15. Average of last fall records, four years: November 9. Latest fall record: November 30, 1933. Twelvemile Lake (McCreary).

RED-BREASTED MERGANSER. *Mergus serrator.* Transient. Earliest spring record: three seen, March 25, 1934, Hutton Lake (McCreary). Average of first spring records, three years: April 5. Latest spring record: May 12, 1929, Cheyenne (J. Gundlach). Winter records: one seen December 31, 1933, Twin Buttes Lake, Albany County; and two seen February 4, 1934, Wheatland Flats on irrigation reservoir (McCreary).

TURKEY VULTURE. *Cathartes aura septentrionalis.* Earliest spring record: April 15, 1931, Cheyenne (L. R. Wolfe). Average of first spring records, four years: April 29. Average of last fall records, four years: September 20. Latest fall record: October 2, 1926, Archer, Laramie County (McCreary).

EASTERN GOSHAWK. *Astur atricapillus atricapillus.* Earliest spring record: February 28, 1932, Woods Creek, Medicine Bow Forest (McCreary). Average of first spring records, three years: March 18. Average of last fall records, three years: October 26. Latest fall record: November 10, 1928, Woods Creek (McCreary).

SHARP-SHINNED HAWK. *Accipiter velox velox.* Earliest spring record: specimen in the University of Wyoming collection dated March 30, 1903, Laramie (Knight). Average of first spring records, six years: April 30. Average of last fall records, three years: October 12. Latest fall record: October 15, 1928, Laramie (McCreary). Two winter records: December 27, 1928, Torrington (McCreary); and January 12, 1929, Lusk (McCafferty) (24).

COOPER'S HAWK. *Accipiter cooperi.* Two winter records: February 5, 1928, Woods Creek, Medicine Bow Forest (McCreary); and February 14, 1932, Fox Creek, Albany County (Mickey). Average of first spring records, six years: April 22. Average of last fall records, three years: October 21.

WESTERN RED-TAILED HAWK. *Buteo borealis calurus.* Earliest spring record: March 25, 1934, Ninemile Lake (Mickey). Average of first spring records, eight years: April 7. Average of last fall records, seven years: October 1. Latest fall record: October 19, 1930, Torrington (McCreary). One winter record: February 6, 1927, Laramie River, Albany County (McCreary).

SWAINSON'S HAWK. *Buteo swainsoni.* Three winter records: January 1, 1927, and January 2, 1928, Laramie (McCreary); and January 29, 1928, Pine Bluffs (McCreary). Average of first spring records, seven other years: April 14. Average of last fall records, five years: October 18.

American Rough-legged Hawk. *Buteo lagopus s. johannis.* Winter visitant. Earliest fall record: October 13, 1927, Laramie Plains (McCreary). Average of first fall records, three years: October 23. Latest spring record: March 29, 1927, Laramie Plains (McCreary).

Duck Hawk. *Falco peregrinus anatum.* Transient. Earliest spring record: April 2, 1933, Soda Lakes (McCreary). Latest spring record: May 8, 1933, Torrington (McCreary). Neilson (26) reports seeing this bird near Wheatland in fall, but we do not have any dates for it.

Richardson's Pigeon Hawk. *Falco columbarius richardsoni.* Transient. Earliest spring record: March 13, 1927, Millbrook, Albany County (McCreary). Average of first spring records, five years: March 30. Average of last spring records, four years: May 17. Latest spring record: May 20, 1932, Laramie (Mickey). Earliest fall record: August 15, 1870, LaBonte Creek (Stevenson and Smith) (29). Average of first fall records, five years: September 5. Average of last fall records, six years: November 6. Latest fall record: one collected November 27, 1895, Laramie (Knight) (23). One winter record: December 25, 1927, Wheatland (McCreary).

Desert Sparrow Hawk. *Falco sparverius phalaena.* Occasionally seen in winter. Average of first spring records, eight years: April 2. Average of last fall records, three years: October 24.

Little Brown Crane. *Grus canadensis canadensis.* One spring record: specimen taken April 3, 1912, Sodergreen Lake, Albany County (Lockwood) (21). One fall record: specimen taken October 7, 1898, Glendo (Jeserun) (23).

Sandhill Crane. *Grus canadensis tabida.* One spring record: April 28, 1927, Sevenmile Lake (McCreary). One fall record: specimen taken October 10, 1896, Shell Creek, Albany County (Knight) (23).

Virginia Rail. *Rallus limicola limicola.* Arrives in spring about May 1, Wheatland (Neilson) (26). Latest fall record: October 8, 1933, Laramie (Mickey).

Sora. *Porzana carolina.* Arrives in spring about May 1, Wheatland (Neilson) (26). Latest fall record: September 19, 1934, Laramie (Mickey).

American Coot. *Fulica americana americana.* Earliest spring record: March 25, 1934, Hutton Lake (McCreary). Average of first spring records, ten years: April 11. Average of last fall records, six years: November 9. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

PIPING PLOVER. *Charadrius melodus.* Transient. Earliest spring record: specimen taken May 30, 1892, Cheyenne (Bond) (23). Latest spring record: three seen June 12, 1929, Torrington (McCreary).

SNOWY PLOVER. *Charadrius nivosus* ssp. A specimen was taken by Bond at Cheyenne (23). One was seen June 20, 1933, at Bamforth Lake by McCreary, and later by several other observers. It was last seen July 2, 1933, by J. W. Scott. Latest record: July 29, 1934, Bamforth Lake (McCreary).

SEMIPALMATED PLOVER. *Charadrius semipalmatus.* Transient. Earliest spring record: May 12, 1929, Cheyenne (J. Gundlach). Latest spring record: May 19, 1933, Laramie (McCreary). Earliest fall record: August 13, 1933, Creighton Lake (Mickey). Latest fall record: August 26, 1928, Bamforth Lake (McCreary).

MOUNTAIN PLOVER. *Eupoda montana.* Earliest spring record: March 25, 1928, Laramie Plains (McCreary). Average of first spring records, ten years: April 13. Average of last fall records, seven years: August 16. Latest fall record: August 24, 1932, Laramie Plains (McCreary).

KILLDEER. *Oxyechus vociferus vociferus.* Frequently stays all winter. When not present in the winter it appears in the spring in March. Average of first spring records, eight years: March 25. Average of last fall records, five years: October 15.

AMERICAN GOLDEN PLOVER. *Pluvialis dominica dominica.* One record: three were taken near Camp Dawes on Rock Creek, October 25, 1870 (Stevenson and Smith) (29).

BLACK-BELLIED PLOVER. *Squatarola squatarola.* Transient. Earliest spring record: May 11, 1884, Cheyenne (Bond) (12). Average of first spring records, three years: May 13. Latest spring record: May 18, 1933, Bamforth Lake (McCreary). Earliest fall record: October 21, 1928, Laramie (McCreary). Latest fall record: November 9, 1930, Alsop Lakes, Albany County (McCreary).

NORTHERN CURLEW. *Numenius americanus occidentalis.* Earliest spring record: April 15, 1889, Cheyenne (Bond) (12). Average of first spring records, five years: April 24. Average of last fall records, five years (August 5-19): August 12. Exceptionally late fall record: October 9, 1927, Bamforth Lake (McCreary).

UPLAND PLOVER. *Bartramia longicauda.* Earliest spring record: May 5, 1879, Lake Como (Williston) (31). Average of first spring records, six years: May 8. Average of last fall records, six years: August 18. Latest fall record: September 1, 1930, Laramie (McCreary).

Spotted Sandpiper. *Actitis macularia.* Earliest spring record: May 1, 1927, Laramie (McCreary). Average of first spring records, nine years: May 6. Average of last fall records, eight years: September 10. Latest fall record: October 5, 1933, Laramie (Mickey).

Western Solitary Sandpiper. *Tringa solitaria cinnamomea.* Transient. Earliest spring records: April 20, 1929 and 1932, Laramie (McCreary). Average of first spring records, eight years: April 24. Average of last spring records, seven years: May 13. Latest spring record: May 25, 1928, Laramie (McCreary). Earliest fall record: June 28, 1934, Laramie (McCreary). Average of first fall records, eight years: July 13. Average of last fall records, eight years: September 5. Latest fall record: October 1, 1927, Laramie (McCreary).

Western Willet. *Catopthrophorus semipalmatus inornatus.* Transient. Earliest spring record: April 25, 1931, Sevenmile Lake (Mickey). Average of first spring records, nine years: May 4. Average of last spring records, seven years: May 25. Latest spring record: June 3, 1922, Wheatland (Neilson) (25). Earliest fall record: June 17, 1934, Hutton Lake (A. Hamm). Average of first fall records, five years: July 14. Average of last fall records, four years: September 5. Latest fall record: October 1, 1933, Wheatland Reservoir (J. W. Scott).

Greater Yellow-legs. *Totanus melanoleucus.* Transient. Earliest spring record: April 4, 1928, Medicine Bow (McCreary). Average of first spring records, eleven years: April 12. Average of last spring records, four years: May 14. Latest spring record: May 29, 1914, Laramie (Henninger) (22). Exceptionally early fall record, obtained during the drouth: June 22, 1934, Laramie (McCreary). Average of first fall records, seven other years (July 19-August 21): August 5. Average of last fall records, eight years: October 2. Latest fall record: October 24, Medicine Bow (4).

Lesser Yellow-legs. *Totanus flavipes.* Transient. Earliest spring record: April 21, 1934, Laramie (McCreary). Average of first spring records, nine years: May 1. Average of last spring records, six years: May 18. Latest spring record: June 1, 1914, Laramie (Henninger) (22). Exceptionally early fall record, obtained during the drouth: June 14, 1934, Laramie (McCreary). Average of first fall records, six other years (July 4-August 21): July 19. Average of last fall records, six years: October 15. Latest fall record: October 22, 1926, Laramie (McCreary).

Pectoral Sandpiper. *Pisobia melanotos.* Transient. One spring record: May 12, 1933, Torrington (McCreary). Exceptionally early

fall record, obtained during the drouth: July 8, 1934, Soda Lakes (McCreary). Average of first fall records, two other years (August 5-13): August 9. Average of last fall records, three years: September 3. Latest fall record: a specimen in the University of Wyoming collection dated September 14, 1897, Sevenmile Lake (C. W. Gilmore).

WHITE-RUMPED SANDPIPER. *Pisobia fuscicollis.* Transient. Earliest spring record: specimen taken May 16, 1875, Ft. Laramie (4) (Newberry). Average of first spring records, three years: May 23. Latest spring record: June 17, 1933, Bamforth Lake (Mickey). We have no fall records.

BAIRD'S SANDPIPER. *Pisobia bairdi.* Transient. Earliest spring record: March 31, 1929, Laramie (McCreary). Average of first spring records, eight years: April 16. Average of last spring records, six years: May 24. Latest spring record: May 31, 1931, Laramie (McCreary). Earliest fall record: June 24, 1933, Bamforth Lake (Mickey). Average of first fall records, eight years: July 15. Average of last fall records, four years: October 13. Latest fall record: October 21, 1928, Sevenmile Lake (McCreary).

LEAST SANDPIPER. *Pisobia minutilla.* Transient. Earliest spring records: April 23, Ft. Laramie (4); and April 23, 1888, Cheyenne (Bond) (12). Average of first spring records, ten years: May 2. Average of last spring records, five years: May 24. Latest spring record: May 29, 1933, Goshen County (McCreary). Earliest fall record: July 8, 1934, Soda Lakes (McCreary). Average of first fall records, four years: July 24. Latest fall record: October 21, 1928, Laramie (McCreary).

RED-BACKED SANDPIPER. *Pelidna alpina sakhalina.* One record: one seen August 23, 1930, Sevenmile Lake (McCreary).

LONG-BILLED DOWITCHER. *Limnodromus griseus scolopaceus.* Transient. Earliest spring record: May 3, 1889, Cheyenne (Bond) (12). Average of first spring records, five years: May 7. Average of last spring records, three years: May 16. Latest spring record: May 17, 1933, Laramie (Mickey). Earliest fall record: June 26, 1875, Ft. Sanders, Albany County (Brackett) (9). Average of first fall records, five years: July 13. Average of last fall records, four years: October 14. Latest fall record: October 25, 1928, Sevenmile Lake (A. McIntosh).

STILT SANDPIPER. *Micropalama himantopus.* Transient. Earliest spring record: three taken May 15, 1875, Ft. Laramie (J. S. Newberry) (30). Latest spring record: May 25, 1889, Cheyenne (Bond) (6).

Earliest fall record: sixteen seen July 29, 1934, Bamforth Lake (McCreary). Latest fall record: one seen August 20, 1933, Ninemile Lake (McCreary).

Semipalmated Sandpiper. *Ereunetes pusillus.* Transient. One spring record: May 19, 1933, Laramie (McCreary). Two fall records: one taken August 22 or 23, 1870, North Platte River, Natrona County (Stevenson and Smith) (29); and one skin in the University of Wyoming collection dated August 31, 1897, Bamforth Lake (C. W. Gilmore). By some error Knight (23) copied this record as October 31, and the erroneous date has appeared in other publications (4).

Marbled Godwit. *Limosa fedoa.* Transient. Earliest spring record: April 25, 1931, Sevenmile Lake (Mickey). Average of first spring records, six years: May 4. Average of last spring records, four years: May 15. Latest spring record: May 19, 1933, Bamforth Lake (Mickey). Earliest fall record, obtained during the drouth: July 13, 1934, Bamforth Lake (McCreary). Average of first fall records, four years: July 26. Average of last fall records, four years: August 31. Latest fall record: September 14, 1933, Laramie (McCreary).

Sanderling. *Crocethia alba.* Transient. Earliest spring record: May 5, 1879, Lake Como (Williston) (32). Average of first spring records, five years: May 13. Average of last spring records, four years: May 22. Latest spring record: May 26, 1892, Douglas (Jeserun) (23). Earliest fall record: August 26, 1928, Bamforth Lake (McCreary). Latest fall record: October 1, 1927, Bamforth Lake (McCreary).

Avocet. *Recurvirostra americana.* Earliest spring record: April 14, 1928, Ninemile Lake (McCreary). Average of first spring records, eleven years: April 26. Average of last fall records, five years: September 22. Latest fall record: October 7, 1933, Wheatland Reservoir (R. Honess).

Black-necked Stilt. *Himantopus mexicanus.* Earliest record: one seen June 11, 1933, Creighton Lake (Mr. and Mrs. Mickey, Draize, and McCreary). Two were seen June 20 and 30, 1934, Bamforth Lake (McCreary).

Red Phalarope. *Phalaropus fulicarius.* One specimen in the University of Wyoming collection is dated September 14, 1897, Sevenmile Lake (C. W. Gilmore).

Wilson's Phalarope. *Steganopus tricolor.* Earliest spring record: April 25, 1933, Laramie (McCreary). Average of first spring records, nine years: May 3. Average of last fall records, eight years:

August 30. Latest fall record: September 19, 1926, Laramie (McCreary).

NORTHERN PHALAROPE. *Lobipes lobatus.* Transient. Earliest spring record: May 13, 1933, Bamforth Lake (Mickey). Average of first spring records, four years: May 16. Average of last spring records, four years: May 23. Latest spring record: May 28, 1879, Lake Como (Williston) (32). Fall records: specimens taken by Mr. and Mrs. Allen McIntosh, September 29, 1928, Twelvemile Lake, and October 6, 1928, Bamforth Lake.

GLAUCOUS GULL. *Larus hyperboreus.* One taken by Elmer Isberg, November 23, 1933, Lake Hattie.

HERRING GULL. *Larus argentatus smithsonianus.* Transient. Earliest spring record: a dead bird brought to the University to be identified, March 18, 1932. Latest spring record: May 29, 1932, Wheatland Reservoir (Scott). Earliest fall record: August 6, 1933, Wheatland Reservoir (McCreary). Latest fall record: November 24, 1932, Lake Hattie (McCreary). One winter record: January 1, 1934, Lake Hattie (McCreary).

RING-BILLED GULL. *Larus delawarensis.* Earliest spring record: March 19, 1934, Hutton Lake (F. Mazel). Average of first spring records, eight years: April 2. Average of last fall records, seven years: November 17. Latest fall record: November 30, 1933, Hutton Lake (McCreary).

FRANKLIN'S GULL. *Larus pipixcan.* Transient. Earliest spring record: May 5, 1933, Torrington (McCreary). Average of first spring records, three years: May 7. Latest spring record: May 12, 1933, Torrington (McCreary). One fall record: July 27, 1928, near Iowa Center, Platte County (J. Gundlach).

BONAPARTE'S GULL. *Larus philadelphia.* Transient. Earliest spring record: April 21, 1934, Lake Hattie (Mickey). Average of first spring records, five years: April 30. Latest spring record: June 8, 1933, Laramie (McCreary). Earliest fall record: June 21, 1934, Laramie (McCreary). Latest fall record: a specimen in the University of Wyoming collection dated November 18, 1896, Laramie (E. Land).

ATLANTIC KITTIWAKE. *Rissa tridactyla tridactyla.* One record: specimen taken November 18, 1898, Douglas (Jeserun) (23).

FORSTER'S TERN. *Sterna forsteri.* Earliest spring record: May 2, 1934, Laramie (McCreary). Average of first spring records, six years: May 18. Average of last fall records, four years (July 31-September

4): August 17. Exceptionally late fall record: September 30, 1932, Laramie (McCreary).

Least Tern. *Sterna antillarum antillarum.* It occurs in summer along the North Platte River in Goshen County. First record for Wyoming: June 11, 1929, Torrington (McCreary). Earliest spring record: May 27, 1933, Torrington (McCreary).

Black Tern. *Chlidonias nigra surinamensis.* Earliest spring record: May 11, 1934, Hutton Lake (McCreary). Average of first spring records, seven years: May 21. Usually disappears in August. Average of last fall records, four years (August 2-26): August 13. Exceptionally late fall record: October 1, 1927, Bamforth Lake (McCreary).

Western Mourning Dove. *Zenaidura macroura marginella.* Earliest spring record: April 14, 1933, Laramie (McCreary). Average of first spring records, nine years: April 25. Average of last fall records, eight years: October 4. Latest fall record: October 30, 1927, Laramie (McCreary). One winter record: a specimen taken January 20, 1934, Cheyenne (J. Simon).

Black-billed Cuckoo. *Coccyzus erythropthalmus.* Earliest spring record: a specimen taken May 21, 1893, Douglas (Jeserun) (23). Average of first spring records, five years: May 30. We have no fall records.

Western Burrowing Owl. *Speotyto cunicularia hypugaea.* Earliest spring record: April 15, 1934, Laramie (Mickey). Average of first spring records, five years: April 28. Average of last fall records, five years: August 29. Latest fall record: a specimen taken September 6, 1923, Wheatland (Fuller) (20).

Short-eared Owl. *Asio flammeus flammeus.* Earliest spring records: March 30, 1930 and 1934, Laramie (McCreary). Latest fall record: November 6, 1927, Laramie (McCreary). One winter record: January 6, 1930, Goshen County (McCreary).

Nuttall's Poor-will. *Phalaenoptilus nuttalli nuttalli.* Earliest spring record: May 3, 1932, Torrington (McCreary). Average of first spring records, four years: May 16. Average of last fall records, two years: September 6. Latest fall record: specimen taken September 7, 1857, Laramie Mountains (Hayden) (3).

Nighthawk. *Chordeiles minor* ssp. Three subspecies of the Nighthawk occur in this region (27), but the dates given here are sight records and the subspecies could not be determined. Earliest spring record: May 24, 1933, Torrington (McCreary). Average of first spring records, nine years: June 1. Average of last fall records, seven

years: September 25. Latest fall record: October 10, 1928, Laramie (McCreary).

WHITE-THROATED SWIFT. *Aëronautes saxatalis saxatalis.* Earliest spring record: April 24, 1927, Sand Creek, Albany County (McCreary). Average of first spring records, three years: April 30. Average of last fall records, three years: September 1. Latest fall record: one captured in Agricultural Hall, University of Wyoming, September 9, 1934.

BROAD-TAILED HUMMINGBIRD. *Selasphorus platycercus platycercus.* Earliest spring record: May 20, 1934, Laramie (McCreary). Average of first spring records, six years: May 24. Average of last fall records, nine years: September 3. Latest fall record: September 16, 1933, Laramie (McCreary).

RUFOUS HUMMINGBIRD. *Selasphorus rufus.* We have no spring records. Earliest fall record: July 12, 1934, Laramie (McCreary). Average of first fall records, four years: July 17. Average of last fall records, four years: August 5. Latest fall record: August 13, 1934, Laramie (McCreary).

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus.* Earliest spring record: May 17, 1932, Torrington (McCreary). Average of first spring records, six years: May 27. Average of last fall records, five years: September 2. Latest fall record: one taken September 6, 1923, Wheatland (Fuller) (20).

LEWIS'S WOODPECKER. *Asyndesmus lewis.* Earliest spring records: May 14, 1930 and 1931, Laramie (McCreary). Average of first spring records, six years: May 17. Average of last fall records, six years: September 9. Latest fall record: September 24, 1933, Laramie (Mickey).

RED-NAPED SAPSUCKER. *Sphyrapicus varius nuchalis.* Earliest spring record: April 9, 1932, Laramie (McCreary). Average of first spring records, five years: May 6. Average of last fall records, four years: October 10. Latest fall record: October 25, 1932, Laramie (McCreary).

EASTERN KINGBIRD. *Tyrannus tyrannus.* Earliest spring record: May 7, 1927, Laramie (McCreary). Average of first spring records, nine years: May 16. Average of last fall records, nine years: August 22. Latest fall record: September 9, 1934, Laramie (McCreary).

ARKANSAS KINGBIRD. *Tyrannus verticalis.* Earliest spring record: May 5, 1932, Lingle (McCreary). Average of first spring records, eight years: May 12. Average of last fall records, nine years: August

29. Latest fall records: September 5, 1926 and 1927, Laramie (McCreary); and September 5, 1934, Laramie (Mickey).

Cassin's Kingbird. *Tyrannus vociferans.* Earliest spring record: specimen taken May 6, 1892, Douglas (Jeserun) (23). Average of first spring records, 4 years: May 12. Average of last fall records, four years: September 12. Latest fall record: specimen taken September 18, 1911, Albany County (Walker) (21).

Say's Phoebe. *Sayornis saya saya.* Earliest spring record: April 7, 1889, Cheyenne (Bond) (13). Average of first spring records, thirteen years: April 17. Average of last fall records, nine years: September 14. Latest fall record: October 3, 1926, Laramie (McCreary).

Alder Flycatcher. *Empidonax trailli trailli.* Earliest spring record: May 30, 1929, Laramie (McCreary). Latest fall record: September 7, 1930, Laramie (McCreary).

Least Flycatcher. *Empidonax minimus.* Earliest spring record: May 5, 1933, Torrington (McCreary). Average of first spring records, two years: May 8.

Hammond's Flycatcher. *Empidonax hammondi.* Earliest spring record: May 13, 1934, Laramie (McCreary). Latest fall record: one taken October, 1871, Ft. Steele (Allen) (1). Allen did not arrive at Ft. Steele until October 9.

Wright's Flycatcher. *Empidonax wrighti.* Earliest spring record: May 9, 1933, Guernsey (McCreary). Average of first spring records, seven years: May 19. Average of last fall records, two years: September 10. Latest fall record: September 13, 1926, Laramie (McCreary).

Western Flycatcher. *Empidonax difficilis difficilis.* Earliest spring record: May 20, 1928, Laramie (McCreary). Latest fall record: one taken September 13, 1894, Douglas (Jeserun) (23).

Western Wood Pewee. *Myiochanes richardsoni richardsoni.* Earliest spring record: May 19, 1932, Torrington (McCreary). Average of first spring records, seven years: May 27. Average of last fall records, six years: September 25. Latest fall record: September 30, 1931, Laramie (McCreary).

Olive-sided Flycatcher. *Nuttallornis mesoleucus.* Earliest spring record: May 16, 1933, Laramie (McCreary). Average of first spring records, three years: May 21. Average of last fall records, three years: September 9. Latest fall record: September 18, 1926, Laramie (McCreary).

VIOLET-GREEN SWALLOW. *Tachycineta thalassina lepida.* Earliest spring record: May 7, 1930, Laramie (McCreary). Average of first spring records, four years: May 14. Average of last fall records, three years: August 31. Latest fall record: September 7, 1926, Laramie (McCreary).

TREE SWALLOW. *Iridoprocne bicolor.* Earliest spring record: April 11, 1930, Laramie (McCreary). Average of first spring records, five years: April 18. Latest fall record: October 1, 1927, Laramie Plains (McCreary).

BANK SWALLOW. *Riparia riparia riparia.* Earliest spring record: April 23, 1929, Laramie (McCreary). Average of first spring records, six years: April 30. Average of last fall records, five years: August 26. Latest fall record: September 4, 1933, Laramie (McCreary).

ROUGH-WINGED SWALLOW. *Stelgidopteryx ruficollis serripennis.* Earliest spring records: May 1, 1927, Laramie (McCreary); May 1, 1931 and 1933, Torrington (McCreary); and May 1, 1928, Laramie (Gundlach). Average of first spring records, eight years: May 6. Average of last fall records, five years: August 28. Latest fall record: September 6, 1931, Laramie (McCreary).

BARN SWALLOW. *Hirundo erythrogaster.* Exceptionally early spring record: April 21, 1889, Cheyenne (Bond) (28). Average of first spring records, nine other years (May 1-7): May 4. Average of last fall records, six years: September 16. Latest fall record: September 24, 1928, Guernsey (McCafferty) (24).

NORTHERN CLIFF SWALLOW. *Petrochelidon albifrons albifrons.* Earliest spring record: May 10, 1928, Laramie (McCreary). Average of first spring records, nine years: May 13. Average of last fall records, seven years: August 22. Latest fall record: September 4, 1933, Laramie (McCreary).

NORTHERN BLUE JAY. *Cyanocitta cristata cristata.* Earliest spring record: May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records, four years: May 9. Average of last fall records, four years: October 7. Latest fall record: October 22, 1933, Laramie (Mickey). One winter record: January 29, 1928, Pine Bluffs (McCreary).

WESTERN CROW. *Corvus brachyrhynchos hesperis.* Earliest spring record: February 28, 1933, Laramie (McCreary). Average of first spring records, eight years: March 12. Average of last fall records, ten years: October 18. Latest fall record: October 26, 1930, Laramie (McCreary). Two winter records: December 27, 1929, Casper (McCreary); and January 31, 1932, Laramie (Mickey).

Black-eared Nuthatch. *Sitta pygmaea melanotis.* Earliest spring record: April 17, 1932, Fish Creek, Albany County (Scott). Latest fall record: October 18, 1926, Telephone Canyon, Albany County (McCreary).

Western House Wren. *Troglodytes aëdon parkmani.* Earliest spring records: May 1, 1931, Guernsey, and May 1, 1933, Torrington (McCreary). Average of first spring records, eight years: May 10. Average of last fall records, six years: September 20. Latest fall record: October 3, 1926, Laramie (McCreary).

Western Winter Wren. *Nannus hiemalis pacificus.* One record during migration: October 26, 1930, Laramie (McCreary).

Western Marsh Wren. *Telmatodytes palustris plesius.* Two specimens taken near Laramie were named *plesius* by Oberholser, but our sight records may include *laingi* and *dissaëptus.* Earliest spring record: March 30, 1930, Laramie (McCreary). Average of first spring records, eight years: April 14. Our only late date is July 28, 1929, Torrington. Two winter records: December 24, 1928, Wheatland, and January 29, 1928, Pine Bluffs (McCreary).

Cañon Wren. *Catherpes mexicanus conspersus.* We have three records: April 17, 1928, Laramie (McCreary); August, 1928, Medicine Bow River Canyon (Gundlach); and August 22, 1931, Laramie, one found in Agricultural Hall, University of Wyoming (Mickey).

Common Rock Wren. *Salpinctes obsoletus obsoletus.* Exceptionally early spring record: April 2, 1930, Laramie (McCreary). Average of first spring records, nine other years (April 29-May 14): May 8. Average of last fall records, eight years: September 26. Latest fall record: October 21, 1928, Laramie (McCreary). One winter record: December 30, 1928, Guernsey (McCreary).

Western Mockingbird. *Mimus polyglottos leucopterus.* Exceptionally early spring record: April 30, 1894, Douglas (Jeserun) (11). Average of first spring records, four other years (May 15-May 23): May 18. Latest fall record: September 16, 1933, Laramie (McCreary).

Catbird. *Dumetella carolinensis.* Earliest spring record: May 11, 1929, Cheyenne (McCreary). Average of first spring records, nine years: May 16. Average of last fall records, seven years: September 21. Latest fall record: September 26, 1929, Laramie (McCreary).

Brown Thrasher. *Toxostoma rufum.* Earliest spring records: May 1, 1931 and 1933, Torrington (McCreary). Latest fall record: one taken August 30, 1923, Chugwater (Fuller) (20). One winter record: January 4, 1930, Torrington (McCreary).

SAGE THRASHER. *Oreoscoptes montanus.* Earliest spring record: March 25, 1934, Hutton Lake (McCreary). Average of first spring records, nine years: April 15. Average of last fall records, seven years: September 23. Latest fall record: September 30, 1933, Laramie (Mickey).

WESTERN ROBIN. *Turdus migratorius propinquus.* Occasionally found in winter: January 29, 1928, Pine Bluffs; January 6, 1930, Cheyenne (McCreary); and January 28, 1932, Laramie (Mickey). In some years migrants are seen in late February: February 21, 1931, Torrington (L. R. Wolfe). In 1927 none were seen until March 26. The large flocks arrive in April and leave for the south early in October.

ALASKA HERMIT THRUSH. *Hylocichla guttata guttata.* One collected September 9, 1898, Laramie (Knight) (23).

AUDUBON HERMIT THRUSH. *Hylocichla guttata auduboni.* Our migration records are all sight records and may include other subspecies. Earliest spring record: April 19, 1934, Torrington (McCreary). Average of first spring records, seven years: April 30. Average of last fall records, six years: October 19. Latest fall records: October 30, 1927 and 1932, Laramie (McCreary).

OLIVE-BACKED THRUSH. *Hylocichla ustulata swainsoni.* Earliest spring record: May 4, 1933, Torrington (McCreary). Average of first spring records, eight years: May 8. Average of last fall records, seven years: October 6. Latest fall record: October 20, 1934, Laramie (Mickey).

GRAY-CHEEKED THRUSH. *Hylocichla minima aliciae.* Transient. Earliest spring record: May 10, 1933, Torrington (McCreary). Average of first spring records, three years: May 13. Latest spring record: May 25, 1932, Torrington (McCreary). We have no fall records.

WILLOW THRUSH. *Hylocichla fuscescens salicicola.* Earliest spring record: May 6, 1933, Torrington (McCreary). Average of first spring records, seven years: May 13. Average of last fall records, two years: September 1. Latest fall record: September 7, 1931, Laramie (McCreary).

MOUNTAIN BLUEBIRD. *Sialia currucoides.* Earliest spring record: February 22, 1932, Sand Creek, Albany County (R. Honess). Average of first spring records, eight years: March 5. Average of last fall records, eight years: October 18. Latest fall record: October 23, 1932, Tie Siding, Albany County (J. W. Scott).

Western Golden-crowned Kinglet. *Regulus satrapa olivaceus.* One spring record: May 19, 1931, Laramie (McCreary). Average of last fall records, seven years: September 30. Latest fall record: October 26, 1932, Laramie (McCreary). Winter records: December 25, 1929, and January 6, 1930, Cheyenne (McCreary).

Eastern Ruby-crowned Kinglet. *Corthylio calendula calendula.* Earliest spring record: April 16, 1929, Laramie (McCreary). Average of first spring records, six years: April 30. Average of last fall records, seven years: October 16. Latest fall record: October 26, 1933, Laramie (McCreary).

American Pipit. *Anthus spinoletta rubescens.* Exceptionally early spring record: March 22, 1934, Laramie (McCreary). Average of first spring records, eight other years (April 9-30): April 22. Average of last fall records, six years: October 16. Latest fall record: October 21, 1926, Laramie (McCreary).

Sprague's Pipit. *Anthus spraguei.* Transient. Earliest spring record: April 17, 1927, Laramie (McCreary). Latest spring record: May 17, 1934, Laramie (McCreary). We have no fall records.

Bohemian Waxwing. *Bombycilla garrula pallidiceps.* Winter visitant. Earliest fall record: November 8, 1931, Laramie (McCreary). Average of first fall records, two years: November 10. Average of last spring records, three years: April 6. Latest spring record: April 16, 1932, Laramie (McCreary).

Cedar Waxwing. *Bombycilla cedrorum.* Earliest spring record: one collected May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records, six years: May 21. Average of last fall records, five years: September 27. Latest fall record: October 16, 1933, Laramie (McCreary).

Northwestern Shrike. *Lanius borealis invictus.* Winter visitant. Earliest fall record: October 16, 1928, Laramie (McCreary). Average of first fall records, seven years: October 22. Average of last spring records, six years: April 2. Latest spring record: April 15, 1934, Laramie (Mickey).

White-rumped Shrike. *Lanius ludovicianus excubitorides.* Exceptionally early spring record: February 20, 1932, Laramie Plains (Mickey). Average of first spring records, eight other years (April 15-29): April 22. Average of last fall records, six years: September 22. Latest fall record: October 15, 1932, Laramie (Mickey).

Plumbeous Vireo. *Vireo solitarius plumbeus.* Earliest spring record: May 7, 1927, Laramie (McCreary). Average of first spring

records, three years: May 16. Average of last fall records, six years: September 13. Latest fall record: October 4, 1934, Laramie (McCreary).

Red-eyed Vireo. *Vireo olivaceus.* Transient. Earliest spring record: May 24, 1933, Torrington (McCreary). Average of first spring records, seven years: May 27. Average of last spring records, three years: June 6. Latest spring record: June 10, 1929, Cheyenne (McCreary). Earliest fall record: August 22, 1934, Laramie (McCreary). Average of first fall records, three years: August 27. Average of last fall records, four years: September 5. Latest fall record: September 12, 1926, Laramie (McCreary).

Western Warbling Vireo. *Vireo gilvus swainsoni.* Exceptionally early spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, seven other years (May 21-June 1): May 27. Average of last fall records, eight years: September 1. Latest fall record: September 14, 1933, Laramie (McCreary).

Black and White Warbler. *Mniotilta varia.* Transient. Earliest spring record: May 3, 1930, Laramie (McCreary). Latest spring records: specimen taken May 17, 1899, Douglas (Jeserun) (23); and one seen May 17, 1932, Laramie (Mickey). One fall record: September 23, 1928, Laramie (McCreary).

Tennessee Warbler. *Vermivora peregrina.* Transient. Earliest spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, three years: May 17. Average of last spring records, three years: May 27. Latest spring record: May 28, 1927, Laramie (McCreary). Earliest fall record: August 28, 1928, Laramie (McCreary). Average of first fall records, four years: September 7. Average of last fall records, four years: September 30. Latest fall record: October 5, 1933, Laramie (McCreary).

Orange-crowned Warbler. *Vermivora celata* ssp. Earliest spring record: April 30, 1931, Torrington (McCreary). Average of first spring records, six years: May 4. Average of last fall records, five years: September 29. Latest fall record: October 25, 1933, Laramie (McCreary).

Nashville Warbler. *Vermivora ruficapilla ruficapilla.* Two records: one taken May 29, 1898, Chugwater (Knight) (23); and one seen May 9, 1933, Ft. Laramie (McCreary).

Northern Parula Warbler. *Compsothlypis americana pusilla.* Three records: one taken May 30, 1888, Cheyenne (Bond) (23); one seen May 5, 1931, and May 12, 1933, Torrington (McCreary).

Eastern Yellow Warbler. *Dendroica aestiva aestiva.* Earliest spring record: May 2, 1933, Lingle (McCreary). Average of first spring records, eleven years: May 11. Average of last fall records, nine years: September 4. Latest fall record: September 14, 1933, Laramie (McCreary).

Magnolia Warbler. *Dendroica magnolia.* Four records: May 21, 1889, Cheyenne (Bond); one collected May 19, 1932, Torrington (McCreary); and one seen May 23 and 24, 1933, Torrington (McCreary).

Myrtle Warbler. *Dendroica coronata.* Transient. Earliest spring record: April 17, 1932, Woods, Albany County (Mickey). Average of first spring records, ten years: April 26. Average of last spring records, five years: May 23. Latest spring record: May 25, 1933, Laramie (Mickey). Earliest fall record: September 24, 1933, Laramie (McCreary). Average of first fall records, three years: October 2. Average of last fall records, five years: October 16. Latest fall record: October 23, 1930, Laramie (McCreary).

Audubon's Warbler. *Dendroica auduboni auduboni.* Earliest spring record: April 20, 1931, Cheyenne (L. R. Wolfe). Average of first spring records, nine years: May 3. Average of last fall records, seven years: October 18. Latest fall record: October 29, 1932, Laramie (McCreary).

Townsend's Warbler. *Dendroica townsendi.* Transient. Two spring records: May 11, 1929, Cheyenne, and May 15, 1927, Jelm, Albany County (McCreary). Earliest fall record: August 11, 1932, Laramie (McCreary). Average of first fall records, seven years: August 24. Average of last fall records, ten years: September 25. Latest fall record: October 15, 1928, Laramie (McCreary).

Chestnut-sided Warbler. *Dendroica pensylvanica.* One record: one collected May 23, 1889, Cheyenne (Bond) (6).

Black-poll Warbler. *Dendroica striata.* Earliest spring record: May 8, 1888, Cheyenne (Bond) (10). Average of first spring records, eight years: May 12. Average of last spring records, five years: May 20. Latest spring record: May 27, 1878, Lake Como (Williston) (31). We have no fall records.

Western Palm Warbler. *Dendroica palmarum palmarum.* One record: one seen May 10, 1933, Torrington (McCreary).

Oven-bird. *Seiurus aurocapillus.* Two records: May 19, 1932, Ft. Laramie, and May 25, 1933, Lingle (McCreary).

GRINNELL'S WATER-THRUSH. *Seiurus noveboracensis notabilis* Transient. Earliest spring records: one taken May 10, 1878, Lake Como (Williston) (31); and one seen May 10, 1933, Torrington (McCreary). Average of first spring records, five years: May 13 Average of last spring records, three years: May 16. Latest spring record: May 18, 1933, Laramie River, Albany County (Mickey). Earliest fall record: August 9, 1934, Ft. Steele (McCreary). Average of first fall records, four years: August 13. Average of last fall records, three years: August 29. Latest fall record: September 13, 1929, Laramie (McCreary).

MACGILLIVRAY'S WARBLER. *Oporornis tolmiei.* Earliest spring record: May 7, 1933, Torrington (McCreary). Average of first spring records, five years: May 12. Average of last fall records, seven years: September 17. Latest fall record: October 5, 1934, Laramie (McCreary).

WESTERN YELLOW-THROAT. *Geothlypis trichas occidentalis.* Earliest spring records: May 2, 1930, Laramie, May 2, 1931, Torrington, and May 2, 1933, Lingle (McCreary). Average of first spring records, ten years: May 10. Average of last fall records, seven years: September 18. Latest fall record: October 12, 1930, Laramie (McCreary).

LONG-TAILED CHAT. *Icteria virens longicauda.* Earliest spring records: May 10, 1930, Guernsey (McCafferty) (24); and May 10, 1932, Torrington (McCreary). Average of first spring records, four years: May 18. One fall record: September 5, 1932, Torrington (McCreary).

NORTHERN PILEOLATED WARBLER. *Wilsonia pusilla pileolata.* Earliest spring record: one collected May 4, 1932, Lingle (McCreary). Average of first spring records, eight years: May 12. Average of last fall records, six years: October 11. Latest fall record: October 16, 1928, Laramie (McCreary).

AMERICAN REDSTART. *Setophaga ruticilla.* Earliest spring record: May 4, 1933, Torrington (McCreary). Average of first spring records, eight years: May 17. Average of last fall records, five years: September 4. Latest fall record: September 12, 1933, Laramie (McCreary).

BOBOLINK. *Dolichonyx oryzivorus.* Earliest spring record: May 16, 1927, Laramie (McCreary). Average of first spring records, nine years: May 20. We have no fall records.

YELLOW-HEADED BLACKBIRD. *Xanthocephalus xanthocephalus.* Earliest spring record: April 14, 1929, Laramie (McCreary). Average

of first spring records, eight years: April 25. Average of last fall records, five years: October 7. Latest fall record: October 20, 1928, Laramie (McCreary). Winter records: December 25, 1927, and February 26, 1928, Wheatland (McCreary).

Baltimore Oriole. *Icterus galbula.* Three records: July 20, 1927, Wheatland (Fuller and Bole) (20); May 6, 1929, Guernsey (McCafferty) (24); and May 6, 1931, Torrington (McCreary).

Bullock's Oriole. *Icterus bullocki.* Earliest spring record: May 11, 1929, Cheyenne (McCreary). Average of first spring records, twelve years: May 14. Average of last fall records, six years: August 26. Latest fall record: September 6, 1934, Laramie (Mr. and Mrs. Mickey).

Rusty Blackbird. *Euphagus carolinus.* One record: twelve seen December 25, 1927, Wheatland (McCreary).

Brewer's Blackbird. *Euphagus cyanocephalus.* A few individuals occasionally stay all winter. Average date of arrival of flocks from the south, nine years: April 27. Average of last fall records, eight years: November 1.

Bronzed Grackle. *Quiscalus quiscala aeneus.* Earliest spring record: April 13, 1930, Laramie (McCreary). Average of first spring records, eight years: April 23. Average of last fall records, seven years: September 25. Latest fall record: October 14, 1934, Laramie (McCreary).

Nevada Cowbird. *Molothrus ater artemisiae.* Earliest spring record: April 26, 1928, Laramie (McCreary). Average of first spring records, eight years: May 1. Average of last fall records, eight years: August 13. Latest fall record: September 5, 1926, Laramie (McCreary).

Western Tanager. *Piranga ludoviciana.* Earliest spring record: May 13, 1932, Laramie (Mickey). Average of first spring records, eleven years: May 23. Average of last fall records, eight years: September 23. Latest fall record: October 12, 1934, Laramie (McCreary).

Rose-breasted Grosbeak. *Hedymeles ludovicianus.* A pair were seen near Wheatland, July 1, 1932 (Mr. and Mrs. Mickey). One was seen May 11, 1933, Torrington (McCreary).

Rocky Mountain Grosbeak. *Hedymeles melanocephalus papago.* Earliest spring record: May 12, 1932, Torrington (McCreary). Average of first spring records, eleven years: May 21. Average of last fall records, four years: September 14. Latest fall record: September 24, 1928, Guernsey (McCafferty) (24).

Lazuli Bunting. *Passerina amoena.* Earliest spring record: May 6, 1929, Guernsey (McCafferty) (24). Average of first spring records,

eight years: May 16. Average of last fall records, five years: September 2. Latest fall record: September 14, 1932, Laramie (McCreary).

Cassin's Purple Finch. *Carpodacus cassini.* Exceptionally early spring record: February 25, 1929, Laramie (McCreary). Average of first spring records, five other years (April 6-May 1): April 21. Average of last fall records, five years: October 12. Latest fall record: November 1, 1927, Laramie (McCreary).

Hepburn's Rosy Finch. *Leucosticte tephrocotis littoralis.* Winter visitant. Earliest fall record: November 8, 1926, Laramie (McCreary). Average of first fall records, two years: November 18. Average of last spring records, seven years: March 25. Latest spring record: April 9, 1929, Laramie (McCreary).

Gray-crowned Rosy Finch. *Leucosticte tephrocotis tephrocotis.* Winter visitant. Earliest fall record: October 25, 1928, Laramie (Knight) (23). Average of first fall records, seven years: November 17. Average of last spring records, seven years: March 23. Latest spring record: April 13, 1929, Laramie (McCreary).

Common Redpoll. *Acanthis linaria linaria.* Winter visitant. Earliest fall record: one collected October 25, 1870, Rock Creek (Stevenson and Smith) (29). Average of first fall records, seven years: November 9. Latest spring record: a specimen in the University of Wyoming collection dated April 14, 1897, Laramie (Knight).

Arkansas Goldfinch. *Spinus psaltria psaltria.* Three records: one collected May 26, 1889, Cheyenne (Bond) (23); and one seen May 23, 1931, and August 4, 1931, Laramie (McCreary).

Green-tailed Towhee. *Oberholseria chlorura.* Earliest spring record: May 2, 1929, Laramie (McCreary). Average of first spring records, seven years: May 11. Average of last fall records, five years: September 26. Latest fall record: October 12, 1930, Laramie (McCreary).

Arctic Towhee. *Pipilo maculatus arcticus.* Earliest spring record: April 9, 1927, Laramie (McCreary). Average of first spring records, five years, April 28. Average of last fall records, five years: October 3. Latest fall records: one collected October 27 or 28, 1870, Ft. Sanders, Albany County (Stevenson and Smith) (29).

Lark Bunting. *Calamospiza melanocorys.* Earliest spring record: May 3, 1932, Laramie and Goshen Counties (McCreary). Average of first spring records, thirteen years: May 10. Average of last fall records, ten years: August 26. Latest fall record: September 9, 1923, Laramie County (Fuller and Bole) (20).

Savannah Sparrow. *Passerculus sandwichensis* ssp. Earliest spring record: April 17, 1929, Laramie (McCreary). Average of first spring records, eight years: April 20. Average of last fall records: six years: September 23. Latest fall record: October 16, 1927, Laramie (McCreary).

Baird's Sparrow. *Ammodramus bairdi.* Six were seen May 2, 1931, Torrington (McCreary). Mentioned by Bond as one of the species of birds found in Wyoming (5).

Western Vesper Sparrow. *Pooecetes gramineus confinis.* Earliest spring records: April 12, 1888, Cheyenne (Bond) (16); April 12, Laramie (Knight) (23); April 12, 1930, Laramie; and April 12, 1931, Hutton Lake (McCreary). Average of first spring records, thirteen years: April 18. Average of last fall records, nine years: September 26. Latest fall record: October 9, 1927, Laramie (McCreary).

Western Lark Sparrow. *Chondestes grammacus strigatus.* Earliest spring record: May 2, 1930, Laramie (McCreary). Average of first spring records, eight years: May 5. Average of last fall records, eight years: September 10. Latest fall record: September 22, 1934, Laramie (McCreary).

Northern Sage Sparrow. *Amphispiza nevadensis nevadensis.* Earliest spring record: May 17, 1931, near Wheatland Reservoir (McCreary). Latest fall record: one collected October 25, 1870, Rock Creek (Stevenson and Smith) (29).

White-winged Junco. *Junco aikeni.* Winter visitant. Earliest fall record: one collected October 23, 1897, Laramie Mountains (C. W. Gilmore) (23). Latest spring record: April 11, 1929, Laramie (McCreary).

Slate-colored Junco. *Junco hyemalis hyemalis.* Winter visitant. Earliest fall record: September 23, 1926, Laramie (McCreary). Average of first fall records, five years: October 7. Average of last spring records, nine years: April 17. Latest spring record: May 8, 1929, Laramie (McCreary).

Shufeldt's Junco. *Junco oreganus shufeldti.* Winter visitant. Earliest fall record: September 11, 1934, Laramie (McCreary). Average of first fall records, eight years: October 4. Average of last spring records, eight years: April 17. Latest spring record: May 3, 1929, Laramie (McCreary).

Montana Junco. *Junco oreganus montanus.* Winter visitant. Earliest fall record: September 11, 1934, Laramie (McCreary). Aver

age of first fall records, eight years: October 2. Average of last spring records, eight years: April 24. Latest spring record: May 8, 1929, Laramie (McCreary).

PINK-SIDED JUNCO. *Junco mearnsi.* Winter visitant. Earliest fall record: August 31, 1934, Laramie (McCreary). Average of first fall records, eight years: September 22. Average of last spring records, six years: April 29. Latest spring records: May 8, 1928 and 1929, Laramie (McCreary).

GRAY-HEADED JUNCO. *Junco caniceps.* Earliest spring record: March 23, 1928, Laramie (McCreary). Average of first spring records, eight years: April 12. Average of last fall records, six years: October 13. Latest fall record: November 7, 1933, Laramie (McCreary).

WESTERN TREE SPARROW. *Spizella arborea ochracea.* Winter visitant. Earliest fall record: September 28, 1888, Cheyenne (Bond) (14). Average of first fall records, eleven years: October 17. Average of last spring records, nine years: April 6. Latest spring record: April 14, 1933, Laramie (McCreary).

WESTERN CHIPPING SPARROW. *Spizella passerina arizonae.* Earliest spring record: April 19, 1934, Torrington (McCreary). Average of first spring records, nine years: April 28. Average of last fall records, six years: October 10. Latest fall record: October 18, 1928, Laramie (McCreary).

CLAY-COLORED SPARROW. *Spizella pallida.* Earliest spring record: April 29, 1929, Laramie (McCreary). Average of first spring records, six years: May 3. Average of last fall records, four years: September 24. Latest fall record: October 3, 1926, Laramie (McCreary).

BREWER'S SPARROW. *Spizella breweri breweri.* Earliest spring records: April 28, 1934, Laramie (Mickey); and April 28, 1929 and 1930, Laramie (McCreary). Average of first spring records, six years: May 3. Average of last fall records, five years: September 25. Latest fall record: October 3, 1926, Laramie (McCreary).

HARRIS'S SPARROW. *Zonotrichia querula.* Transient. Earliest spring record: April 19, 1934, Torrington (McCreary). Latest spring record: May 14, 1933, Torrington (McCreary). Earliest fall record: one taken October 7, 1894, Douglas (Jeserun) (23). Average of first fall records, three years: October 13. Average of last fall records, three years: October 30. Latest fall record: November 14, 1929, Laramie (McCreary).

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys leucophrys.* Earliest spring record: April 18, 1889, Cheyenne (Bond) (17). Aver-

age of first spring records, nine years: April 27. Average of last fall records, six years: October 4. Latest fall record: October 14, 1928, Laramie (McCreary).

GAMBEL'S SPARROW. *Zonotrichia leucophrys gambeli.* Exceptionally early spring record: March 29, 1927, Laramie (H. Flick). Average of first spring records, seven other years (April 11-28): April 20. Average of last fall records, eight years: October 22. Latest fall record: October 30, 1927, Laramie (McCreary).

WHITE-THROATED SPARROW. *Zonotrichia albicollis.* We have two records: May 13, 1933, Torrington (McCreary); and one taken October 8, 1894, Douglas (Jeserun) (23).

SLATE-COLORED FOX SPARROW. *Passerella iliaca schistacea.* Two records: May 6, 1928, Fox Creek, Albany County (McCreary); and September 30, 1933, Laramie (Mickey).

LINCOLN'S SPARROW. *Melospiza lincolni lincolni.* Earliest spring record: April 8, 1928, Laramie (McCreary). Average of first spring records, nine years: May 1. Average of last fall records, nine years: October 3. Latest fall record: a specimen in the University of Wyoming collection dated October 20, 1899, Laramie (C. W. Gilmore).

MCCOWN'S LONGSPUR. *Rhynchophanes mccowni.* Exceptionally early spring record: March 12, 1889, Cheyenne (Bond) (15). Average of first spring records, nine other years (April 6-24): April 14. Average of last fall records, six years: October 12. Latest fall record: October 27, 1927, Laramie Plains (McCreary).

ALASKA LONGSPUR. *Calcarius lapponicus alascensis.* Winter visitant. Earliest fall record: October 15, 1928, Laramie (McCreary). Average of first fall records, eight years: November 2. Average of last spring records, five years: March 17. Latest spring record: a specimen in the University of Wyoming collection dated April 3, 1899, Laramie (A. Jennings).

CHESTNUT-COLLARED LONGSPUR. *Calcarius ornatus.* Exceptionally early spring record: March 16, 1890, Cheyenne (Bond) (23). Average of first spring records, two other years (April 16-17): April 17. We have no fall records.

EASTERN SNOW BUNTING. *Plectrophenax nivalis nivalis.* Winter visitant. Earliest fall record: a specimen collected December 14, 1859, Deer Creek, Converse County (G. H. Trook) (19). Average of first fall records, three years: December 18. Average of last spring records, four years: March 8. Latest spring record: specimen taken March 19, 1889, Cheyenne (Bond) (18).

## References Cited


1. Allen, J. A. Notes of an Ornithological Reconnaissance of Portions of Kansas, Colorado, Wyoming, and Utah. Bull. Mus. Comp. Zool., Vol. 3, pp. 113-183. 1872.
2. Baird, S. F. "A List of Birds", in Explorations across the Great Basin of Utah in 1859, Appendix K, pp. 377-381. 1876.
3. Baird, S. F., J. Cassin, and G. N. Lawrence. "Birds", in Reports of Explorations and Surveys to Ascertain the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, Vol. 9, pt. 2, 1005 pp. 1858.
4. Bent, A. C. Life Histories of North American Shore Birds, Order Limicolae (Part 1). U. S. Nat. Mus. Bull. 142, 420 pp. 1927.
5. Bond, F. "Birds", in Report of the Governor of Wyoming to the Secretary of the Interior, 1885, pp. 1138-1140. 1885.
6. ———. Notes from Wyoming. Auk, Vol. 6, p. 341. 1889.
7. ———. Capture of a Brown Pelican in Wyoming. Auk, Vol. 16, p. 351. 1899.
8. Brackett, A. G. The Birds of Wyoming. Forest and Stream, Vol. 7, p. 389. 1876.
9. ———. Forest and Stream, Vol. 7, p. 404. 1876.
10. Chapman, F. M. The Warblers of North America. 306 pp. 1907.
11. Cooke, W. W. The Birds of Colorado. Colo. Agr. Expt. Sta., Colo. Agr. Coll., Bull. 37, 144 pp. 1897.
12. ———. Distribution and Migration of North American Shorebirds. Biol. Surv., U. S. Dept. Agr., Bull. 35, 100 pp. 1910.
13. ———. The Migration of Flycatchers. Bird-Lore, Vol. 10, pp. 210-212. 1908.
14. ———. The Migration of North American Sparrows. Bird-Lore, Vol. 11, pp. 254-260. 1909.
15. ———. Bird-Lore, Vol. 13, pp. 15-17. 1911.
16. ———. Bird-Lore, Vol. 13, pp. 83-88. 1911.
17. ———. Bird-Lore, Vol. 14, pp. 98-105. 1912.
18. ———. Bird-Lore, Vol. 15, pp. 16-17. 1913.
19. Coues, Elliot. Birds of the Northwest. U. S. Geol. Surv. of the Territories, Misc. Pub. No. 3, 791 pp. 1874.
20. Fuller, A. B. and B. P. Bole, Jr. Observations on some Wyoming Birds. Sci. Pub. Cleveland Mus. Nat. Hist., Vol. 1, pp. 37-80. 1930.
21. Grave, B. H. and E. P. Walker. The Birds of Wyoming. 137 pp. 1913.
22. Henninger, W. F. June Birds of Laramie, Wyoming. Wilson Bulletin, No. 90, pp. 221-242. 1915.
23. Knight, W. C. The Birds of Wyoming. Wyo. Agr. Expt. Sta., Univ. of Wyo., Bull. 55, 174 pp. 1902.
24. McCafferty, C. E. Annotated and Distributional List of the Birds of Wyoming. Master's Thesis, Univ. of Wyoming. 1930. (Unpublished).
25. Neilson, James A. Wheatland, Wyoming Birds. Oologist, Vol. 40, pp. 70-72. 1923.
26. ———. Personal Letters, 1928. (Unpublished).
27. Oberholser, H. C. A Monograph of the Genus *Chordeiles* Swainson, Type of a New Family of Goatsuckers. U. S. Nat. Mus., Bull. 86, 123 pp. 1914.
28. ———. The Migration of North American Birds. Bird-Lore, Vol. 20, pp. 145-152. 1918.
29. Stevenson, James. "A List of mammals and birds collected in Wyoming Territory, by Mr. H. D. Smith and Mr. James Stevenson, during the expedition of 1870", in Preliminary Report of the United States Geological Survey of Wyoming and Portions of contiguous territories . . . , pt. 5, pp. 461-466. 1872.
30. Swales, B. H. Stilt Sandpiper (*Micropalama himantopus*) in Wyoming. Auk, Vol. 36, p. 102. 1919.
31. Williston, S. W. A List of Birds of Southern Wyoming, with notes by George Bird Grinnell. Forest and Stream, Vol. 12, p. 307. 1879.
32. ———. Forest and Stream, Vol. 12, p. 385. 1879.


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## GENERAL NOTES

**Conducted by M. H. Swenk**

**The Starling in Southeastern South Dakota.**—The Starling (*Sturnus vulgaris*) has been reported from all but three counties in Iowa and is now starting to invade Nebraska and South Dakota. Mr. Arthur Lundquist of Webster, South Dakota, reported the Starling in Day County, South Dakota (Wilson Bulletin, XLVI, p. 62, March, 1934) which is in the extreme northeastern part of the state. On Christmas day of 1934 the writer saw a Starling near Elk Point, Union County, in the extreme southeastern corner of the state. It is interesting to note that the Starling was recorded from a point nearly 300 miles north in the state a year before it was found in the southern corner of the state, near the Iowa boundary, where Starlings have been reported at different times since 1932.—William Youngworth, *Sioux City, Iowa.*

**A Red-shafted Flicker Secured at Des Moines, Iowa.**—An adult male Red-shafted Flicker (*Colaptes cafer collaris*) was collected by the writer at Des Moines, Polk County, Iowa, on December 26, 1934. This bird, noted along Walnut Creek in west Des Moines, had bright red shafts to the primaries, secondaries, and rectrices, and these were conspicuous in flight. This specimen, now in the writer's collection, is believed to be the third Iowa specimen now preserved.

When the *Revised List of the Birds of Iowa* was published in 1933, the writer knew of no existing Iowa specimens. Recently Mr. Frank C. Pellett of Hamilton, Illinois, wrote that the specimen of Red-shafted Flicker secured by him at Atlantic, Cass County, September 25, 1896, was still in his private collection at Atlantic. Mr. James R. Harlan of Des Moines, secured an adult male in Van Buren County, October 22, 1933. It is of interest to note that exactly six years before, Miss Olivia McCabe observed two Red-shafted Flickers at Des Moines at the time of the 1928 Christmas Census.—Philip A. DuMont, *Des Moines, Iowa.*

**A Cowbird Removes a Robin's Egg.**—While seated at the dinner table, at about 5:30 P. M. on May 3, 1934, I saw a female Eastern Cowbird (*Molothrus ater ater*) skulking through the foliage of the low evergreens around the foundation of the house. She quickly passed beyond the limits of my vision, but a friend, also seated at the table, observed that the Cowbird alighted in a pyramidal arborvitae and proceeded to a Robin's nest that contained four eggs which had been under incubation for several days. The bird was seen to seize one of the eggs and to fly to the ground, holding it in her mandibles. The sudden appearance of a dog caused the Cowbird to fly away, leaving the egg laying on the ground only a few yards from the window. On examining the egg we found that it had been punctured in three places. Apparently the egg had been carried with the mandibles separated considerably and driven deeply into the shell. The Robin's nest was not further molested by the Cowbird and the remaining eggs hatched in due course of time.—Benedict J. Blincoe, *Route* 13, *Dayton, Ohio.*

**Apparent Scarcity of Certain North Dakota Birds.**—During the first week of June, 1934, I made a hurried trip to North Dakota, going directly to Bowman County on the Montana boundary and then working east through the butte country to Bismarck, later making a quick trip to Cando and up the Red River Valley on the way home. The scarcity of the big hawks was of interest and corroborated the conclusions of Mr. Norman A. Wood following his work in the state, in 1920 and 1921, when he found such a dearth of these birds. One

Prairie Falcon was seen near Flasher, and a lone Swainson's Hawk was noticed near Buffalo Springs, to sum up the birds actually seen. The Marsh Hawk is holding its own and many birds of this species were seen in all parts of the state. The Upland Plover was gone from the regions visited, and one lone pair was found at Buffalo Springs Lake in Bowman County. In many suitable places the writer found scattered pairs of Western Willets and Marbled Godwits, but the Upland Plovers were not to be found. Possibly the birds are being killed off in their winter home, as I doubt if many are killed in the summer or during migrations.—Wm. Youngworth, *Sioux City, Iowa.*

**"The House Wren.**—The mischievousness of the House Wren (*Troglodytes aedon* Verill) is well known. The following incident came under my observation a short time since. A pair of Martins had taken possession of a box that I had erected in the garden for their benefit; had built their nest, laid their eggs, and had commenced setting, when a pair of house wrens, who coveted their neighbor's house, entered it in the absence of the Martins, and coolly picked up their eggs one by one, carried them out, and dropped them to the ground below. While engaged in this impudent business, the Martins returned, and while going in at one of the entrances of the box, the daring marauders darted out at the other, and alighting on a tree near by chattered noisily, apparently in great glee. The Martins, finding that their nest had been despoiled, abandoned the box, which was then duly taken possession of by the wrens, who reared two broods of young hopefuls during the summer, the first about the beginning of June, the second the latter part of July.—M. S. Hill, East Liverpool, O." (In the American Naturalist, Volume III, March, 1870, page 49).

**Winter-killing of Mourning Doves in Central Iowa.**—Creek bottomlands grown up to wild hemp (*Cannabis*) are especially favored by late migrating or wintering Mourning Doves (*Zenaidura macroura*) in the vicinity of Ames, Iowa. By late November of 1934, there seemed to be something less than a dozen Mourning Doves (I should judge between eight and ten) wintering about the hemp growths along approximately four miles of Squaw Creek, from the College northwestward. Most of these were concentrated in a tract of about fifteen acres of bottomlands, characterized by dense hemp patches and scattered large trees. To appearances, the food supply was immediately adequate, and the doves were not suffering any conspicuous mortality. Then a heavy snow fell from November 29 to December 3 and persisted for the next few weeks. As a consequence most of the hemp seeds were made unavailable to the doves with the exception of the small quantities still retained on the plants.

The favorite habitat of the Mourning Doves was the regular feeding ground of a covey of sixteen Bob-white Quail (*Colinus virginianus virginianus*) and was visited irregularly by a covey the wintering territory of which was adjacent to the south. With the advent of the December snow, the Bob-whites to the south turned for food to a cornfield in their territory, and thus averted a crisis. The resident covey lost half of its number, largely from starvation, by January 7, and starved out entirely during the winter.

From December 8 to 11, five Mourning Doves were found dead, including three so thoroughly cleaned up by scavengers that only feathers remained. Two carcasses were intact, however, and were carefully examined. Of these latter, one weighed seventy-nine grams and the other eighty-seven grams, or probably between sixty and seventy-five per cent of their full weights. Neither showed extreme

emaciation, but their breast contours indicated an exhaustion of reserve. The stomachs of both were empty, save for a small amount of gravel and hemp seed debris. There were no recognizable injuries.

The snow revealed plainly how the birds picked up intact had met death. The heavier had died quietly in the night at the base of a tree on the exact spot upon which it had alighted. The other was found in early afternoon, no more than a few hours after death. It had terminated its last flight with a twenty-inch slide on the snow. On December 11, one weakly flying dove was flushed in late afternoon from its probable night roost under the roots of a tree overhanging the creek. Feathers were found January 7 at about the place where this bird was last seen.

So far as I have been able to determine, the only Mourning Dove to survive in this general area of about five square miles was one seen on January 21 near a farm yard, where it doubtless had access to grain.—Paul L. Errington, *Iowa State College, Ames, Iowa.*

**Some Bird Notes from Utah.**—During the past several years, while collecting birds in the vicinity of Provo, Utah, the following three rather interesting bird records have been made by the writer. Assistance in identifications was kindly given by Dr. Clarence Cottam, Bureau of Biological Survey, Washington, D. C., and Mr. C. Lynn Hayward, Bringham Young University, Provo, Utah.

On September 30, 1932, in a flooded meadow just south of Provo, two specimens of the Eastern Dowitcher (*Limnodromus griseus griseus*) were taken. Both were females in the winter plumage. They are Nos. 831 and 832, Brigham Young University collection.

On February 22, 1934, at the mouth of Provo River on Utah Lake, a large white gull was seen feeding with a mixed flock of Ring-billed and California Gulls. An attempt was made to collect the stranger, but he proved to be too wary. On February 28 he was joined by a second bird of the same species. The two seemed to have little, if any, affinity for each other, but were seen a number of times in the same flocks of other gulls. After a number of attempts, one of the birds was finally collected with a small-calibre rifle, on March 14, 1934. It was determined as a Glaucous Gull (*Larus hyperboreus*), a male in typical second-year plumage. On subsequent visits to the lake the remaining bird was seen until April 15.

On the evening of February 22, 1934, three strange finches were seen going to roost on the top of some piles a few rods out in the water on the east shore of Utah Lake, near the mouth of Provo River. Since boots were not available, no attempt was made to collect them that evening. However, three nights later the birds returned to the same roost, the male and one of the females coming to rest on the same pile. A shot sent the female tumbling into the water, but the male, though apparently wounded, escaped with the other female into the dusk. Examination revealed the bird to be an Eastern Snow Bunting (*Plectrophenax nivalis nivalis*). This skin, together with that of the Glaucous Gull, remains in the writer's collection.—D. Elmer Johnson, *Brigham Young University, Provo, Utah.*

**A Blue-winged Warbler Record for Decatur County, Indiana.**—On June 12, 1934, while searching for a bird's nest that a neighbor had told me about, I had the pleasure of placing bands upon three immature Blue-winged Warblers (*Vermivora pinus*). From the description of the nest for which I was searching that had been given me, I believed it to be that of the Grasshopper Sparrow.

These birds are not uncommon here, but their nests are not easily found, and as I had been unable to band many of these birds I was especially desirous of locating the nest which, dating from the time when I had first heard of it, should have contained young. Previously I had given up after a very short search on account of rain. This time, however, with a companion I searched carefully among the briers, grasses and scrub sassafras that covered the slopes of an old field above a tangled, thicket-clad ravine. We found nothing except a deserted Field Sparrow's nest containing four damaged eggs, but while at work my attention was attracted by the alarmed Grasshopper Sparrow-like notes of a pair of birds down in the thicket. This continued, and finally I decided to investigate. Carefully, on hands and knees, I made my way beneath the tangled maze of green briers, wild rose bushes and shrubs, until I reached the center of the hollow where the wild growth was less dense. Here I was almost immediately rewarded by seeing the object of my quest. I knew the bird, a Blue-winged Warbler, at once, having seen them during migration, but I had never seen them in breeding season, so did not believe that they nested here. This bird, however, was attending young, for she carried food. I called my companion and we began looking over the ravine for the nest. The two birds (the first one's mate having appeared, also with food) scolded incessantly. At times, especially when we neared a certain spot, they showed unusual agitation, and we redoubled our efforts, believing ourselves to be very near the nest. But the puzzle, we learned after a bit, was that they also acted in this manner when we approached an entirely different part of the ravine. Why? The search, unrewarded, had continued very nearly two hours when I solved the enigma. I was resting, sitting on a half decayed stump within a few yards of one of the "certain spots", and I chanced to be looking in tha' direction when the negligible movement of the little fellow caught my eye. There he sat, a half-grown Blue-winged Warbler, on a dead green brier. Perhaps he was several rods away from the nest he had once used, which would account for the fact that we had not even been able to find the deserted nest. With help I experienced little difficulty in capturing him, also another that I discovered shortly after, near the second place that the adults had guarded closely. We found no more in the thicket, but the actions of one of the parent birds led us to examine an isolated clump of scrub sassafras east of the ravine, and here my companion found the third, and last, young warbler. We banded the three and released them, greatly to the joy of the adults.

I have known these birds since 1923, and while they are said to be native in this region, this is the first time that I have seen them, except during migrating periods. To learn that they nest here is a distinct pleasure, and raises the hope that they may continue to increase until they become as common as one authority claims them to be.—Grant Henderson, *Route 6, Greensburg, Ind.*

**Observations on Some Breeding Birds of Mount Timpanogos, Utah.**—During a part of the month of June, 1934, while making a survey of the animal life of Mount Timpanogos, north of Pr.vo, Utah, we had an opportunity to observe some of the breeding birds, particularly of the aspen covered areas at an elevation of 7,000 to 8,000 feet. Mount Timpanogos is one of the highest peaks in the Wasatch Range, and its lower slopes, covered with dense groves of aspen (*Populus tremuloides*), seem to be a favorite breeding ground for a rather dense population of birds.

A particular aspen tree noted by us seemed to be a highly valued nesting site. The tree was about twelve inches in diameter, partially dead, and perforated with many holes. On June 12 we noted in this single tree three nests of the Western House Wren (*Troglodytes aëdon parkmani*), a pair of Violet-green Swallows (*Tachycineta thalassina lepida*) building the nest, two nests of the Red-naped Sapsucker (*Sphyrapicus varius nuchalis*) containing young birds, and a nest of the Batchelder Woodpecker (*Dryobates pubescens leucurus*). There were, then, at least six nests in this one tree at the same time. The busy atmosphere in the vicinity of this particular tree, produced by the cries of the young birds, the feeding activities of the parents, and the nest building process, were typical of this whole area.

An interesting breeder of these aspen groves is the Western Tanager (*Piranga ludoviciana*). Four of their nests were found with only a little search and I regard this species as one of the most common breeding forms in the aspen habitat. On June 12, when the nests were noted, one of them contained five fresh eggs and the remainder from one to four. The nests were usually built on a projecting branch of a small tree about ten or twelve feet from the ground. They were open affairs composed almost entirely of fine dry twigs woven together in such a way as to make a firm structure and yet one so open that the eggs could faintly be discerned by looking up through the nest from beneath. While we were investigating the nests the tanagers remained in the close vicinity, uttering throaty chirps. When I first heard the full tanager song I mistook it for a Robin's, so nearly did it resemble that bird's song in general form. But the tone in the case of the tanager is much more mellow and has a finer quality, which to my mind is surpassed by few of the mountain singers.

Another species which I am confident breeds on Mount Timpanogos is the Purple Martin (*Progne subis subis*). This bird is of interest in that region because to my knowledge it is the only place in the state where the species has been found. Each summer considerable numbers of these birds may be seen at any time feeding over a small pond known as Salamander Lake. The exact nesting locality on the mountain has to my knowledge not yet been discovered.—C. Lynn Hayward, *Brigham Young University, Provo, Utah.*

**Prairie Falcon Records from Northwestern Iowa.**—The seeming lack of definite records of the Prairie Falcon (*Falco mexicanus*) within recent years in Iowa seems ample justification for the publishing of these occurrences in 1934 and 1935.

An extremely large individual, undoubtedly a female, was seen by Mr. Logan J. Bennett and the writer near Union Slough, northeast of Burt, Kossuth County, January 11, 1934. The color and moustache marks were noted as the bird perched on a fence post. Mr. Bennett noted another Prairie Falcon the next week (January, 1934) north of Akron, Plymouth County. A bird of this spcies was noted in Kossuth County by Dr. Paul L. Errington on January 26, 1934. A Prairie Falcon was seen to wonderful advantage by the writer on February 22, 1934. It was watched as it darted over Whitford Slough, three miles west of Ruthven, Clay County. On January 6, 1935, Mr. James Stevenson and the writer noted two Prairie Falcons. The first, undoubtedly a male, was seen six miles southeast of Webb in Clay County. As it dashed low over a cornfield a large flock of Lapland Longspurs was alarmed and flew up in great confusion. The second bird was seen sitting in a cottonwood tree in a farmer's backyard four miles northeast of

Dickens, Clay County. This specimen, collected by the writer, proved to be a female. The stomach contained the legs, feet, and feathers of a Lapland Longspur. There are at least three other preserved Iowa specimens of the Prairie Falcon.—PHILIP A. DUMONT, *Des Moines, Iowa.*

**The Golden Plover in Indiana.**—On May 6, 1934, while driving about twelve miles southeast of this city, we came acros sa flock of over forty American Golden Plovers (*Pluvialis dominica dominica*) which brought a thrill to me as it did on May 4, 1929, when we encountered a flock of about fifty of these birds twenty-six miles north of here. These are the only ones I ever saw. The birds seen May 6, 1934, were in a clay plowed field, where their gold and black mottled backs blended in with the newly plowed soil, when they were at rest. I had stopped to look for birds along a small stream which flowed through the field, when the plovers were startled and rose in a body, flying in close formation, swinging high and then low, piping their pleasing notes as they went. They circled and came back, then were away again, doing this for three times, when they alighted again in a hollow. We stayed on to get a better view of them, for at first we could not tell whether they were the Golden or the Black-bellied species. After they settled in the hollow and did not move about, depending upon their color to protect them, I crept through the fence and went as close as they would allow, to get a better view. They sat still for some time, then as I approached stood at attention, seeming to depend upon one leader to tell them when it was time to go. I had a fine look at them in their beautiful spring plumage of jet black below and mottled gold and black above, with a white "question mark" on either side of the head running down the sides. The face was black, as was the throat joining the black underparts. But a few of the birds were not so marked. The backs were as the others, but they had no black about the face, neck or breast, although the belly was blackish, which made me think they were not yet in full breeding plumage. The markings about the face were gray and white instead of black and white as in the most of them. I noticed as the birds waited in the field a few would venture about slyly and seemingly not intending to attract attention. As they sat on the ground they faced me and I could hardly get a good view of their backs. Some of the birds bobbed their heads occasionally as I watched them. I approached to within 100 or 150 feet before they suddenly arose and disappeared over the brow of the hill. The plovers were near a little traveled side road.—MRS. HORACE P. COOK, *Anderson, Ind.*

**Notes on Some Winter Birds of Southwestern Ohio.**—Following are the records of the winter occurrences of fifteen species of birds in southwestern Ohio that seem worthy of publication. These have been obtained by field work done in the Cincinnati region during the last five years. Several of the records have appeared before (*Proceedings of the Junior Society of Natural Sciences, Cincinnati, Ohio,* 1930-32), in part, but for completeness it is deemed desirable to list all of them below:

Old Squaw (*Clangula hyemalis*). Mr. Cleveland P. Grant showed me a single female bird feeding just above the mouth of the Big Miami River in Hamilton County, Ohio, on December 31, 1933. I collected the duck, with his aid, and have deposited it in the Ohio State Museum. This is the only Old Squaw record that I know of for Hamilton County.

Killdeer (*Oxyechus vociferus*). Most Killdeers depart from southwestern Ohio by December 15 and do not return until late February. However, the species

was present in Hamilton or Clermont Counties every month of 1932 and in every month of later years except January.

Saw-whet Owl (*Cryptoglaux acadica*). At least fifteen of these birds were observed during the winter of 1932-33 in Union Township of Clermont County. The first was a dead bird found accidentally on December 14, 1932, by kicking it from a snow-drift where it had fallen. One or more of the owls were seen each week-end until February 7, 1933, by W. Goodpaster, C. P. Grant, R. F. Drury, W. Gessing, and the writer. Allowing for duplications and the birds collected by Mr. Goodpaster and myself for the Ohio State Museum and the Cincinnati Society of Natural History, at least fifteen different individuals were seen. The birds, with a single exception, were perched in small red cedars. The owls were all quite tame, permitting one to approach to within five or six feet. One individual found asleep in a dense tangle of wild grape vines, was captured and held captive for four months, being fed on dead specimens of small birds, small mammals, amphibia, and insects. The vertebrate food ranged in size from swamp tree frogs (*Pseudacris triseriata*) to adult chip-munks (*Tamias striatus fisheri*). The pellets cast up averaged about two for each item of food consumed. The wings and feet, and occasionally the heads of birds, were not eaten. Though it devoured insects, amphibia, and seven species of mammals, such birds as Cowbirds, Redwings, and Starlings were untouched. It did, however, relish all other birds offered, especially the sparrows.

Prairie Marsh Wren (*Telmatodytes palustris dissaeptus*).

Brown Thrasher (*Toxostoma rufum*). Both of these species were noted November 15, 1930, at a gravel pit near Newton, Hamilton County, Ohio. Two of the Prairie Marsh Wrens were in a small cattail marsh while a single Brown Thrasher haunted a heavy growth of willows. In both cases the birds were discovered by "squeaking". This date is a full month later than other county records for either species.

Eastern Hermit Thrush (*Hylocichla guttata faxoni*). I have but a single winter record for the region, a female collected December 26, 1932, in Union Township, Clermont County, for the Cincinnati Society of Natural History collection. This bird winters regularly farther east in the hill counties of the state.

Myrtle Warbler (*Dendroica coronata*). About a dozen of these birds passed the winter of 1931-32 in a small grove of red cedars one-half mile west of Gleneste, Clermont County. The following winter only five individuals were located, and, despite intensive search, not a single bird was seen during the past two winters.

Western Palm Warbler (*Dendroica p. palmarum*). On December 26, 1933, Mr. Woodrow Goodpaster picked up an exhausted warbler from the Japanese barberry bushes growing before the Gleneste Garage at Cleneste, Clermont County. The bird died the following day, and, having been brought to me, was made into a skin for the Ohio State Museum. Mr. Charles F. Walker and Mr. Edward S. Thomas of that institution identified the bird (skin No. 6628) as a Western Palm Warbler. This, I believe, constitutes the first winter record of the species for Ohio confirmed by a specimen, though there are two published sight records (Ohio State Museum Science Bulletin, I, No. 1, p. 27, 1928). The 1931 edition of the A. O. U. Check-List includes Ohio in the winter range of the Yellow Palm Warbler (*Dendroica p. hypochrysea*) but does not record the western form as wintering in the state.

Common Redpoll (*Acanthis l. linaria*). A single individual was found feeding on weed tops with a company of Eastern Goldfinches (*Spinus t. tristis*) at a

gravel pit near Newton, Hamilton County, on February 14, 1931.

Eastern Field Sparrow (*Spizella p. pusilla*). Winters rarely. A female bird was collected December 5, 1931, in Union Township of Clermont County and another of the species was observed December 18, 1933, in Avondale of Cincinnati.

Eastern Vesper Sparrow (*Pooecetes g. gramineus*).

White-crowned Sparrow (*Zonotrichia l. leucophrys*).

White-throated Sparrow (*Zonotrichia albicollis*).

Eastern Fox Sparrow (*Passerella i. iliaca*). All four of these sparrows were to be found in numbers during the exceptionally mild winter of 1931-32 in Hamilton, Warren, and Clermont Counties. The following winter the sparrows were far fewer in numbers and the Vesper Sparrows were absent, though the observations included only Clermont and Hamilton Counties. During both winters notes for Union Township of Clermont County indicated an approximate ratio of one White-crowned Sparrow and two White-throated Sparrows for each Fox Sparrow seen. None of the four sparrows were detected during the winters of 1933-34 and 1934-35.

Eastern Snow Bunting (*Plectrophenax nivalis*). On March 26, 1930, twelve of these birds were observed feeding about a small bare spot of a weedy hillside in Avondale of Cincinnati. The birds were very tame and permitted me to approach to within thirty feet before taking flight.—Karl H. Maslowski, *Cincinnati, Ohio.*

**The Present Status of the Olive-sided Flycatcher as a Breeding Bird in Western North Carolina and Eastern Tennessee.**—Any studies dealing with the distribution of bird life in more or less limited areas reveal changes that are as puzzling as, apparently, they are inevitable. Even relatively common species disappear without any obvious reason, while on the other hand new species will appear and gradually become a characteristic feature of the indigenous fauna. In the case of the Olive-sided Flycatcher (*Nuttallornis mesoleucus*) a species is represented that at one time occurred during the summer months in the mountains of western North Carolina and eastern Tennessee wherever conditions were favorable, but now is extremely scarce and rarely observed in this region. It is possible that it was never common at this extreme southern limit of its breeding range, but until recent years it was frequently noted by field ornithologists, and recorded at such widely separated spots in western North Carolina as Highlands and Roan Mountain. During a period of almost five years of intensive field work in these mountains, from January, 1930, through September, 1934, this species was looked for on every possible occasion, but seemingly it had disappeared from its former haunts, and at only one spot was one pair of these birds found. On July 10, 1932, while in the Great Smoky Mountains, the loud vigorous notes of one of these birds were heard, and a short search soon revealed it perched in the very top of a tall dead spruce at the edge of a clearing near the top of a ridge. This was within a quarter of a mile of Newfound Gap, on the Tennessee side of the line, and at an altitude of approximately 5,000 feet. Lack of time prevented any serious effort to find the nest, but judging from the action of the bird there could be little question but that it was breeding here, a fact verified the following year when a pair of these birds was found at this same spot in late June. So conspicuous a species as this one cannot easily be overlooked, so it is doubtful if many of these birds now occur in this region during the summer months, and their ultimate fate should be watched with interest.—Thomas D. Burleigh, *Bureau of Biological Survey, Washington, D. C.*

## ORNITHOLOGICAL LITERATURE

THE RÔLE OF ENVIRONMENT IN THE LIFE OF BIRDS. By S. Charles Kendeigh. Reprinted from Ecological Monographs, Vol. 4, pp. 299-417, July, 1934.

The revolt against purely observational ornithology is taking two forms.

In one the investigator makes deductions from field observations and then seeks to check and analyze his deductions by controlled experiments. Stoddard and Errington are examples.

In the other the investigator conducts controlled experiments and then seeks to interpret the results in terms of facts observed in the field. Rowan's "Bird Migration" and Kendeigh's present paper both exemplify this approach.

The title is broader than the actual matter. "Temperature Relations of the Eastern House Wren" would be accurate, but too limited, for Kendeigh treats not only of direct temperature responses, but also the interactions between temperature and other factors, and in discussing his data he covers not only wrens, but draws many analogies from the whole ornithological field.

Our author begins with the standard ecological ritual of assigning the Eastern Wren to the *Acer-Fagus* association. However, it "is not confined to nor characteristic of the climax community itself, but occurs throughout the seral stages wherever there are *suitable nesting sites*" (italics mine). In other words, the wren is associated neither with *Acer* nor with *Fagus*, but rather with the preceding stages of the plant succession common to all forest soils. Even then the association depends on nesting holes. Such walking around the block to get next door is, I realize, common practice among ecologists, but hardly necessary for one who has plenty of substantial matter to report. To my mind it adds only length to an otherwise excellent paper.

Kendeigh presents wren census data collected since 1926 on the grounds of the Baldwin Bird Research Laboratory in Ohio. In these data he detects a fluctuation in breeding density and an inverse relation between density and reproduction. Errington's finding of an inverse relation between Bob-white density and winter survival of breeding stock would seem pertinent here, but is not cited. King, I am told, is about to publish on an inverse relation between density and egg clutch in Ruffed Grouse. This confluence of three separate investigations is noteworthy. It may herald an impending discovery of major importance.

To make this experimental study of temperature, Kendeigh had to sacrifice the lives of many birds, hence he used trapped English Sparrows instead of wrens. The survival time of confined unfed sparrows was measured, at various temperatures, for various conditions of body weight, water ingestion, age, sex, humidity, wind, light, season, and plumage. Similar measurements on a smaller number of wrens showed survival phenomena resembling those of sparrows, but controlled by a different and higher range of temperature toleration. This leads the author to the conjecture that migratory species have a faster metabolism than non-migratory, but lack certain endocrine adjustments which enable the non-migratory species to withstand more cold on less food. The long cold nights of winter and the hot humid noons of summer are conceived to be critical times for all birds. The long foodless night is liable to depress the body temperature below its lethal lower limit. Undue activity at noon is liable to raise the body temperature above its lethal upper limit. These are sample parts of a "temperature hypothesis" which can not, for lack of space, be here set forth in full.

The field of bird behavior is next reviewed and interpreted in the light of this hypothesis. Roosting, nesting, feeding, and migration phenomena check well enough. Distribution of wrens is interpreted in terms of "climographs" which seem somewhat less convincing. Incidentally, a new formula is offered for converting standard weather bureau records into temperatures affecting roosts.

New data on certain sparrows are presented in support of the theory that heavy individuals migrate north earliest. The winter survival and reproduction of wrens is analyzed in relation to the night temperatures on their winter and breeding ranges respectively.

There follows a review and discussion of solar radiation as a factor in migration, distribution, and abundance. Some suggestive but not conclusive correlations with sunshine are derived. A correlation with the six-year sunspot cycle seems visible in the survival and reproduction curves, but is not mentioned by the author.

A less thorough review and discussion of food, precipitation, wind, "biotic interactions", and physiography closes the paper.

Viewed in broad perspective, Kendeigh's monograph may be regarded as one of the rungs of a new ladder by which ornithology is climbing out of a blind alley. In the 1920's life history climbed to a higher level when interpreted by ecological studies. In the 1930's ecology seems destined to take on new meaning when interpreted in the light of physiological research. Kendeigh has ably pioneered the beginnings of this second ascent.—Aldo Leopold.

The Influence of Climatic and Weather Factors Upon the Numbers of Birds on a Depositing Creek Bank. By Jesse M. Shaver. Ecological Monographs, Vol. 3, No. 4, Oct., 1933, pp. 535-597, 25 figs., 19 tables.

The object of this study, as stated by the author, was "to investigate the local motility or change of habitat of birds as the weather changed" (p. 537). The habitat selected for study was a depositing creek bank having a strip of vegetation approximately thirty-six feet in width. Unfortunately, neither the length nor the area of the strip was given so that it is impossible to estimate the adequacy of the sample plot or to compute the number of individuals per unit area. The composition and character of the vegetation was, however, described in the desirable detail. There is a discussion and review of literature dealing with methods of taking bird censuses and with effects on birds of various climatic factors. The author rejects the method of counting singing males only, since censuses were taken at all seasons of the year (weekly from September 5, 1922, to October 1, 1923, and monthly from November, 1925, to January 1 ,1926), and counts all species and individuals observed. The author might have mentioned two important papers concerned with methods of taking censuses (Schiermann, Jour. f. Ornith., LXXVIII, 1930, 137-180; Palmgren, Acta Zoo. Fennica, 7, 1930, 1-218). These two papers came too late to have influenced the actual census taking but would have aided in the interpretation of the data already obtained.

A total of eighty-eight species were recorded, making an average of 10.51 species and 25.87 individuals per trip. For analysis, both graphical and statistical methods were employed, and the species were separated into permanent residents, summer residents, winter visitors, migrants, and total individuals. The year was divided into two periods for separate study, an autumn and winter period (September 21-March 21) and a spring and summer period (March 21-September 21).

For determining effect of climate on general trends in abundance, statistically smoothed curves of each climatic factor for the hours (or days) of observation were compared with smoothed curves of number of individuals. In this way it was found that, in general, the climatic factors ranked in the following order of importance: temperature, sunshine duration, relative humidity, wind velocity, atmospheric pressure, and precipitation, although the order of importance of these factors varied between the two periods of the year and from one group of birds to another. For determining the effect of weather (as contrasted with climate) on the actual abundance of birds, the deviation of each weather factor on each day from its smoothed curve was compared with the deviation in number of birds from its smoothed curve. For the most part these correlations were very low and of lesser significance, the highest correlations being found between the number of summer resident birds and sunshine duration, relative humidity, atmospheric pressure, wind velocity, and temperature.

The reviewer is of the opinion that the reliability of the correlations between climatic and weather factors and "local motility or change of habitat of birds" would have been greatly increased, if other behavior responses such as migration and establishment of territories had first been eliminated. This could have been approximated more closely by dividing the year for analysis into four three-months periods: the summer months with breeding and territory behavior in full force, the autumn and spring months with migration in full sway and local movements difficult to discern, and the winter months when these forms of behavior are mostly eliminated. Allowance should have been made also for variation in food supply in the area and for increases and decreases in number of birds due to reproduction and mortality. As it is, the results obtained can be considered suggestive only, but at that, the reviewer believes that Dr. Shaver has made a courageous pioneer attempt at analyzing fluctuations in populations of non-game species, that his use of the statistical method of analysis is commendable, and that his paper should be a stimulus to all students in avian ecology for the development of more perfect census methods and the careful and more complete analysis of the rôle played by various environmental factors in the life of birds.—S. Charles Kendeigh.

A Guide to Bird Songs. By Aretas A. Saunders. D. Appleton-Century Company, New York. 1935. Pp. i-xvii+1-285. 163 song diagrams. Pocket size. Price, $2.50.

From his many articles and his handbook on bird song (published in 1929 by the New York State Museum, Albany), Mr. Saunders may now be regarded as the leading authority in this country on this subject.

Mr. Saunders' earlier handbook (1929) dealt more with the science and philosophy of bird song. The present book is a descriptive guide to the recognition of specific songs. And for this purpose the author has developed a rather extensive scheme of graphic representation. Many different methods of bird song notation have been suggested. In all of them a "good ear" and some knowledge of human music seem to be an asset to the student. But the method so fully worked out by Mr. Saunders does seem to have the advantage of simplicity. And anyone who has a special interest in bird song should study this book. For general principles and meaning of bird song the student will find nothing more complete than Mr. Saunders' earlier booklet.

A very ingenious key to songs, covering twenty pages of text, identifies somewhat over a hundred songs of common birds. How workable this key may be

for beginners one can only tell after testing it in the field. But, at least, up to the present time the novice has had nothing like so compact and promising an aid in the identification of bird songs. After the probable identity has been worked out in the key, a citation refers the reader to the more detailed description in the text. The text also includes a description of the field marks and habitat. Thus the book becomes a real field guide. Comments on distribution refer chiefly to the eastern part of the country. With this book in hand we anticipate renewed interest in our field work.—T. C. S.

THE HAWKS OF NORTH AMERICA, THEIR FIELD IDENTIFICATION AND FEEDING HABITS. By John Bichard May. Published by the National Association of Audubon Societies, New York. 1935. Pp. i-xxxii+1-140. Pls. 36. Price, $1.25.

In 1876 Henry G. Vennor published "Our Birds of Prey, or the Eagles, Hawks, and Owls of Canada". This work gave little emphasis to the economic status of the birds, but the existing knowledge of their habits and distribution was well summarized. In 1893 Dr. A. K. Fisher published "The Hawks and Owls of the United States in Their Relation to Agriculture", as Bulletin No. 3 of the U. S. Division of Ornithology and Mammalogy. Since that classic no similar special treatment of the hawks of America has appeared until the one here reviewed.

Dr. May's book is timely because for many years the public opinion has been against the raptorial birds in general, and they have been persecuted to the point of decimation—quite so with some species and in some localities. The body of the book includes the treatment of thirty-nine species of hawks, with various subspecies. The subject of food and feeding habits is treated fully for most species. For most species a paragraph is given to "description", but less emphasis is put on field identification than would have been expected. The range is quoted from the A. O. U. Check-List, but the small maps of distribution constitute the outstanding scientific feature of the book.

Four of the plates are in black and white, by Mr. R. T. Peterson, and show the field marks of most of the hawks. Thirty-two plates in color are by Major Allan Brooks, and illustrate most of the species. The large plates have made necessary a large format for which the editor has not found a satisfactory typographical arrangement. It is not a field guide, but a useful source of information on these raptorial birds, and we are sorry that the owls were not included. We have been told that the Audubon Association is offering this book to the public at a price below cost, and it would seem that this must be so.—T. C. S.

AMERICAN BIRD BIOGRAPHIES, CONTAINING THE COMPLETE LIFE-HISTORIES OF FAMILIAR BIRDS, WRITTEN IN AUTOBIOGRAPHICAL FORM. By Arthur A. Allen, Ph. D. Published by the Comstock Pub. Co., Ithaca, N. Y., 1934. Pp. 1-238, 183 figs., 20 pls. Price, $3.50.

This is a beautifully made book. Its mechanical perfection is the first point to be noted. The abundance of photographic reproductions, mostly from the author's own negatives, is a feature which adds to the book's attractiveness. The twenty new full-page plates, half of which are in color, have been made especially for this work by George Miksch Sutton.

The text presents the life-history stories of twenty common birds. We had never read one of these metaphorical, ornithological, life-historical, autobiographi-

cal stories so cleverly written by Dr. Allen. So, in order to review this book we had to read one. We selected the one entitled "Jenny Wren's Diary".

Now, having read the story, we have learned a number of things, if we can believe what a bird says. Jenny Wren says that there are still a lot of boys in Florida with guns, and they shoot the birds. She also says that her mate threw the young ones out of the nest after they had hatched, and some other things that we had already heard as well as some that we hadn't heard about. For instance, that she broke the eggs in the Bluebird's nest in order to destroy competition for food. Now, should we call that an instinctive process or a reasoning process?

So these twenty stories relate many typical events in the lives of the birds. It is probably easy reading for many people, but not for us; for it is a constant mental effort to translate the narrative into reality. But the author's intensive knowledge of bird habits is evident on every page. At the end of the book we find twenty-five questions on each of the species treated. Anyone who can answer all of these questions will have a pretty good working knowledge of the birds.—T. C. S.

Natural History Pictures. Unit Three—Bird Studies. By Gayle Pickwell. Publishers Distribution Service, Inc., Los Angeles, Calif. 1935. Price, $6.00.

This work consists of forty-eight very excellent 8x10 halftone plates of birds and their nests with eggs. These plates are printed on heavy paper, and are intended as teaching aids. The pictures prove that Dr. Pickwell is a field photographer of unusual skill. A printed text, in book form, accompanies the set of plates. This text gives much information of especial value in nature study teaching. A previous set of pictures dealt with animals in general, and another one with the life of the desert. We feel slighted because Dr. Pickwell did not include the Wilson Bulletin among the bird magazines, but it is possible he may not have known of it at the time of writing. The publication of so large a series of plates of such size is an expensive undertaking, and we hope that it will meet with success in order that others may follow.—T. C. S.

Proceedings of the Linnaean Society of New York. Nos. 45-46, for 1933-1934. Published by the Society at the American Museum of Natural History, New York. Issued in April, 1935. Pp. 1-119. Price, 75 cents.

This journal is probably not very well known in the Middle West, unfortunately. The reviewer has been surprised to find that its content is chiefly ornithological. The volume at hand contains several important papers worthy of extended notice, but we can scarcely do more than mention the titles. Dr. William K. Gregory has a paper entitled "Remarks on the Origins of the Ratites and Penguins". The question is whether the ratite birds have degenerated from flying ancestors, as rather generally held, or whether they have descended from birds which never possessed the power of flight, as proposed by Dr. Percy R. Lowe, of England. Dr. Gregory reaches the so-called "orthodox" view, on the basis of skeletal characters, that the ratite birds had flying ancestors. Dr. Ernst Mayr discusses "Bernard Altum and the Territory Theory". Altum's work, published in 1868, is now given credit for the first reference to the territory idea. The present paper is a translation of the portions of Altum's work which refer to territory, with a considerable amount of discussion, besides. There are five other ornithological papers and several short notes, mostly of a local nature. The pre-

ceding volume (Nos. 43-44, for 1931-1933) is likewise wholly ornithological. Of special interest is a paper on "Morse's American Bird Lists of 1789 and 1793", by L. Nelson Nichols, with interpolations by Dr. Ernst Mayr. It is a little difficult to be certain of the authorship of all bracketed interpolations—as to whether by Dr. Mayr or Mr. Nichols. Apparently the 1789 list contained 130 bird names, while the 1793 list contained 258 with possibly a few duplications. In another paper Mr. Charles A. Urner discusses the effect of the decrease in eel grass upon the population of wintering geese and brant. James L. Edwards reports that a praying mantis caught and held a hummingbird.—T. C. S.

Second Revised List of the Birds of Ohio. By Milton B. Trautman. Issued by the Bureau of Scientific Research, Division of Conservation. Columbus, 1935. Pp. 3-16. Price, 5 cents.

This is the second condensed list of Ohio birds issued by the same authority for sportsmen and others. It contains 345 forms, with notes on several others not admitted to the list.—T. C. S.

The Hungarian Partridge in the Great Lakes Region. By Ralph E. Yeatter. Bull. No. 5, School of Forestry and Conservation, Univ. Michigan. 1934. Pp. 1-92.

While this report deals with a game bird, and is presented in the parlance of game management, it does contain a great amount of interesting ornithological information. The facts are assembled under these chief headings, life history, food and feeding habits, experimental liberations, mortality factors, population fluctuations, management. The student of life history problems can not overlook this paper.—T. C. S.

Notes on the Birds of the Western Panhandle of Oklahoma. By George Miksch Sutton. Annals Carnegie Museum, XXIV, 1934, pp. 1-50.

The list here mentioned is based upon observations and specimens collected in 1932 and 1933, and includes 136 forms. The forms are listed under trinomials where the author feels sufficiently certain. But in a large number of instances binomials are used, followed by a more or less futile speculation as to the subspecific probability, either with the skins (e. g., Bob-white, Great Horned Owl, Hairy Woodpecker, Blue Jay, Grasshopper Sparrow, to mention only a few); or, on the basis of range (e. g., Solitary Sandpiper, Mockingbird, Nashville Warbler, etc.). In one or two cases doubt was expressed by the author as to specific identity (e. g., Brewer's Blackbird). Furthermore, in a considerable number of cases the author is safely non-committal in subspecific determination by using such words as "apparently", "presumably", and "should be". Other writers, who are more cock-sure, are probably less correct.—T. C. S.

Bulletin of the Essex County Ornithological Club of Massachusetts. Salem, 1934. Pp. 1-60. Price, 50 cents (S. G. Emilio, Peabody Museum, Salem, Mass.).

This annual is published this year by the lithoprint process. Quite remarkable results were obtained in the spacing of the typewritten line. The work seems to be quite satisfactory and, because of its economy, this method of printing might be of interest to many other publishing societies. One of the leading articles is by Mr. Fred H. Kennard, and gives a rather full history of the vicissitudes of the Junco group at the hands of the systemists. All science is, of course, tentative; and it progresses by the publication of the researches and

opinions of scientific workers. However, in reading a summary of particular systematic work, such as Mr. Kennard's, one wonders whether there is not a great and unnecessary waste of effort and publication space.—T. C. S.

At Home with the Birds. By Alfred M. Bailey. Illustrations by Earl G. Wright. Six pages of text. Eight colored plates. Prcie, ten cents.

The two authors, both of the Chicago Academy of Sciences, have produced an authentic booklet on a few of the most common birds which is to be sold in the major chain stores. The text deals chiefly with the nests. The eight colored plates, illustrating as many species, bring to our attention the work of a new bird artist, and are very pleasing. The booklet is designed, of course, to interest the children in birds.—T. C. S.

The Audubon Annual Bulletin for 1934-1935. Published by the Illinois Audubon Society (Chicago Academy of Sciences, Lincoln Park at Center St.). Pp. 1-80.

Many short articles dealing chiefly with local ornithology are contained, as usual, in this Annual. Of particular general interest is a paper by Mr. Gault on "Martins and Martin Houses". He calls attention to a number of defects in the structure of the average martin house, and gives diagrams for one that he considers acceptable.—T. C. S.

Bird Stamps of All Countries. Published by Grosset & Dunlap, 1140 Broadway, New York. Price, $1.00.

This novelty in ornithological recreation may be of interest to some of our readers. It is a stamp album with spaces for stamps of all countries which carry illustrations of birds—all different types of stamps being illustrated. There are several hundreds of them. The book includes about fifty pages, half of which are for the stamps, the other half giving descriptions. It is a well bound little book, suitable for the purpose.—T. C. S.

Mr. E. A. Preble has a splendid biographical sketch of Audubon in the April number of *Nature Magazine*. Portraits of Audubon and his devoted and efficient wife are presented. On a following page in the same magazine an editorial writer gently takes Mr. J. N. Darling to task for being too outspoken in *demanding* protection for wild life, and appeals for patience, tolerance, and coöperation. We can very well understand Mr. Darling's disgust (if he has it, and we suspect it) with protectionists. For twenty years or more protectionists have been mildly or vigorously criticizing the Biological Survey for too much delay, patience, and coöperation with the duck shooters, the cattle grazing interests, and other destroyers. Now, when a Survey Chief, whose sincerity is beyond question, gets a little worked up about the waste of time, eternal discussions, passing of the buck, etc., you can depend upon some good brother conservationist stepping in to calm him down and suggest patience. It is a great world.

The last December number of the *Migrant* (V, No. 4) gives a list of nesting birds for northeastern Tennessee by Messrs. Lyle and Tyler, and numerous other short articles and notes. The issue for March of this year (VI, No. 1) appears in a very attractive new cover, designed by Mr. Ijams, of the T. O. S. With this volume Mr. A. F. Ganier becomes the Editor. The leading article is on whisper songs and is by Mrs. F. C. Laskey. Any contribution to this subject is worth while. It is a subject which has by no means been exhausted. Anyone who has

made observations on night singing and on whisper songs should not hesitate to offer them for publication.

The *Nebraska Bird Review* for January (III, No. 1) contains a list of birds, with migration dates, at Red Cloud, Nebraska, including 172 species. Among the general notes are reports of an unusually extensive invasion of Magpies into eastern Nebraska and the continued spread of the Starling. The April number (III, No. 2) has a paper on the songs of the Western Meadowlark in Nebraska. And Mrs. Geo. W. Trine presents an article condemning the Bronzed Grackle as a marauder and destroyer of other birds. A note from Red Cloud reports that birds were choked to death by the dust in the air.

*Iowa Bird Life* for June (IV, No. 2, 1934) gives an account of the Annual Meeting at Ames. The September issue has a very full review by P. A. DuMont of the status of the Starling in Iowa. Mr. Pierce gives in the Decemebr number a list of birds found in the Backbone State Park (Iowa). The March number (V, No. 1, 1935) contains an article by Mr. E. D. Nauman relating an early experience of Iowa farmers with wild geese. Each issue contains many notes on Iowa bird life.

The three state periodicals just mentioned now seem to be firmly established and the repositories of much valuable information on the bird life in their respective states. They are well edited and deserve the support which they are receiving. Their organizations should encourage the preservation of complete files in many public institutions.

The *Florida Naturalist* for January (VIII, No. 2, 1935) presents a portrait of Dr. T. G. Pearson, with an account of his work for the Audubon Association. Mr. S. A. Grimes gives an instructive account of the habits of the Hooded Warbler, with two very good photographs. The April number contains the report of the annual meeting and other business matters.

The *Redstart* is published by the Brooks Bird Club, of Wheeling, W. Va. The issue for October (II, No. 1, 1934) has notes on the Bewick's Wren, the Broad-winged Hawks, etc. This society is becoming interested in establishing a library. A good account of the W. O. C. meeting at Pittsburgh is found in the January number. In the February issue (II, No. 5, 1935) Prof. Maurice Brooks offers comments on the status of fifteen species as given in the A. O. U. Check-List.

The *Flicker* for October, 1934 (VI, No. 3) is devoted mainly to an annotated list of breeding birds of Minnesota for the season of 1934. The list includes 146 species. In the December issue the Blue-gray Gnatcatcher is reported nesting near St. Cloud; and an interesting experience is related of watching the drumming of the grouse by flashlight.

*News from the Bird Banders* for November, 1934 (IX, No. 4, issued at the Museum of Vertebrate Zoology, Berkeley, California) gives a discussion of inferiorism, based on Dr. Allen's work on the Ruffed Grouse. It is a useful summary. Numerous local notes complete the number. The April number (X, No. 1) contains a numerical summary of the birds banded in the Western Province during 1934. The total is 37,146.

*Inland Bird Banding News.* In the issue for September, 1934, Mr. W. I. Lyon again gives the narrative of his banding expedition to the islands of the Great Lakes, this one being his eleventh annual trip. The December number reports the Annual Meeting, and gives many notes from various states. The

March issue reports about a dozen instances of banded ducks which were shipped from Louisiana to both the Atlantic and Pacific coasts, and later re-trapped at Avery Island, La. This remarkable case of homing instinct recalls the experiments on Noddy and Sooty Terns by Dr. J. B. Watson nearly thirty years ago. In the same number Mr. Lyon mentions several cases of Cowbirds released at short distances from the trapping station, with subsequent return.

The St. Louis Bird Club Bulletin in a recent issue gives a recipe for Starling pie, with facetious remarks, and includes the statement that the result "compares fairly well with one made of blackbirds or English Sparrows ('so would shoe leather')". This may be all right for a Starling pie, but it insinuates about the sparrow pie. We come to the defense of the latter. The one we ate was more tender and more delicate in flavor than the best chicken. It was fit for an epicure. But we can not tell you how it was prepared. Later issues, through May, have been received.

The *Raven* is published by the Virginia Society of Ornithology at Lynchburg, Va., and is issued monthly. Dr. J. J. Murray is the editor. To all outward appearances this periodical got along nicely during the editor's absence of a few months, but no doubt his energy and enthusiasm were missed in the inner circles.

The *Chickadee* is the publication of the Forbush Bird Club, at Worcester, Mass. The issue at hand is for October and December, 1934 (IV, Nos. 3-4). It contains a number of local lists and records of the varied activities of the Club.

The *Night Heron* in a recent number lists seven kinds of bird baths, but not all birds are known to indulge in all forms of the bath.

The TFNA Annual Bulletin for 1934 consists of thirty-one pages of mimeographed sheets, published by the Toledo (Ohio) Field Naturalists' Association. The plan of this record is to review and summarize the activities of the Society for the year. Mr. L. D. Hiett has an interesting discussion of photography for bird study.

# EDITORIAL

THERE SEEMS to be a widespread agreement that the waterfowl of North America are in a very precarious condition as to numbers. The reduction in numbers is probably more acute in some species than in others. It seems to be impossible at the present time to determine to what extent the recent decrease is due to drouth and how much to over-shooting. The determination of these factors has a very important bearing on remedial policies. But the fact remains that one factor is not controllable, while the other one is. Since these two factors operate in relatively unknown degrees to reduce the duck supply, in order to accomplish anything towards the prevention of further reduction an attack on the controllable factor is indicated, namely the closed season.

In advocating a closed season we need not discuss the positive method of increasing the duck supply by restoration of breeding areas, because that is a wholly different and independent matter. It is more important in the long run, but it is a slower process, while the closed season is prompt in results. Restoration work should be undertaken immediately, and results will come in due time—if the birds survive in the meantime.

It is possible that the general rains of the 1935 spring may help much to correct the unfavorable drouth conditions of the last two or three breeding seasons. If this is true to any great extent a closed season may not be so imperative at the present time. Yet the article by Mr. Furniss in this issue of the WILSON BULLETIN indicates that even where there was suitable environment in 1934 it was not inhabited by the normal number of ducks. Of course, in so far as this is the case it must indicate that over-shooting is a more important factor in duck decrease than is lack of proper environment. And if this is true we will face in each succeeding season a stronger demand for a closed season on waterfowl.

What are the objections to a closed season? We may dismiss the reluctance of hunters to give up the sport as lacking in argument, and therefore unsound. But we are of the opinion that the great rank and file of sportsmen are today converted to the closed season idea. We believe that the greatest obstruction to the closed season on waterfowl today comes from the professional game protector, the one who is paid to save the ducks. And it is explained in this way. A closed season on waterfowl would mean that hunters would not buy licenses for hunting. This would mean the loss of thousands of dollars of income to the fish and game departments of the states. The warden forces would be cut down. Thus, it is argued, a closed season would leave the game unprotected, and poaching would go on unrestrained.

This is a formidable argument, but it leads to the extermination of the birds by law, the open season. If the season is closed the extermination may possibly result illegally—the same result in either case. It is possible that the opposition to the closed season may arise also in the thoughts of the officials because of possible loss of employment, but we need not dwell upon this aspect of the case for it is merely an assumption. The fact seems to be that under our present method of financing the fish and game departments the future of the wild fowl is a very gloomy one. They seem to be doomed by the open season, and the closed season does not seem to hold great promise either.

As a remedy we suggest that fish and game departments should be financed by legislative appropriation, in the same way that other departments of the state are financed. The purpose would be to make the wild life protection forces independent of the variable income from licenses to hunt. It would then be possible to declare a closed season whenever the emergency demands. And as time goes on it is likely that the need of a closed season will occur more often than in the past. Even with the contemplated restoration projects in full swing there will never be the abundance of wild life that has existed in the past. It is more than probable that from now on there will be a constant struggle to maintain even the present status of most species of waterfowl. The closed season expedient may have to be resorted to at intervals. Would it not be wise to organize for this possible contingency? And is it not proper for the state to protect its own property? The case of Geer vs. Connecticut established the principle of state ownership of wild life. However, the long-established custom of running the fish and game departments with the income from hunting license fees will not be changed easily. Like other reforms it will come slowly, and only with hard and determined effort.

While the states slowly adjust themselves, in various ways, to the emergency of waterfowl shortage, about our only hope for their recovery lies in the quick response of the federal government. If the Biological Survey can secure the necessary funds for operation, it can declare a closed season on such species as need it; put federal wardens in the field, and exercise a wholesome restraint until the states have had time to adjust themselves to the situation. The immediate problem is to finance the Biological Survey. We have a good deal of confidence in Mr. Darling's desire to do this thing.

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During Recent Months those in control of the remaining sets of Dawson's "The Birds of California" have placed them on the market at greatly reduced prices. The Student's Edition (published at $45.00 and finally offered at $9.50) was promptly disposed of. The Booklover's Edition, published at $110, was then offered at $19.00, and will no doubt be taken up also. We mention these facts in order to offer a word of commendation to the publishers for handling their unsold remainders in this way. The practice of destroying the remainders is so selfish and mercenary that it deserves only condemnation from the scientific world.

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The Article in this issue on the birds of Wyoming is published with the aid of a subsidy.